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# STUDIES OF TYPOGRAPHICAL FACTORS INFLUENCING SPEED OF READING

## X. Style of Type Face*

DONALD G. PATERSON AND MILES A. TINKER
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Editorial, advertising, and printing experts exhibit keen interest in the problem of the relative legibility of various styles of type. In discussing the general problem of the influence of typographical factors on speed of reading with such experts, the writers have been impressed by the fact that attention is so frequently directed to the question of type faces with relative neglect of the problem of size, width of line, leading, etc. It would appear that competition between various families of type faces results in rival claims and counter claims. Absence of definite facts tends to perpetuate such a state of affairs. It is obvious that experiments on the relative legibility of type faces are needed in order to determine the merits of the claims advanced by partisan advocates.

### REVIEW OF LITERATURE

In view of the general importance of the problem it is surprising to find that only three major experiments

* The writers are indebted to the following for aid in conducting this study: Educational Test Bureau, Minneapolis, Minn., for permission to reprint the Chapman-Cook Speed of Reading Tests, Forms A and B, for experimental purposes; and the University of Minnesota Graduate School for research grant.

have been reported in the literature, namely, the work of Roethlein,[1] Burtt and Basch,[2] and Pyke.[3]

Roethlein's study, which has been quoted widely, measured legibility of isolated letters and of letters grouped into nonsense series, in terms of the distance from the eyes at which the letters could be perceived. Miss Roethlein employed six subjects in her experiment and investigated 16 type faces with reference to legibility of isolated letters, and 9 type faces when the letters were grouped. The styles of type investigated were those then in common use. It is to be noted that this experiment deals entirely with isolated letters and meaningless groups of letters and thus fails to give information regarding the relative legibility of type faces as found in actual reading situations. Therefore it would be hazardous to conclude that the similarities and differences found in her experiment hold for the general run of printing conditions. Keeping in mind the limited significance of the findings, it is important to note that the differences between the several type faces used were not very great.

Burtt and Basch, employing a method somewhat similar to that of Roethlein, compared the legibility of isolated upper case and lower case letters for Bodoni, Cheltenham, and Baskerville type faces. Seven subjects were used in the experiment. The largest difference found was between Bodoni and Cheltenham. They attribute the difference primarily to the fact that Cheltenham involves relatively heavy strokes of fairly uniform width whereas Bodoni involves many light strokes. Of course one cannot be certain that differences which affect per-

[1] B. E. Roethlin, *The Relative Legibility of Different Faces of Printing Types.* Amer. J. Psychol., 1912, 23, 1-36.

[2] H. E. Burtt and C. Basch, *Legibility of Bodoni, Baskerville Roman, and Cheltenham Type faces.* J. Appl. Psychol., 1923, 7, 237-245.

[3] R. L. Pyke, *Report on the Legibility of Print.* H. M. Stationery Office, London, 1926, pp. 123.

ceptibility at a distance would have the same effect on speed of reading when text materials printed with these different type faces are read at the ordinary reading distance.

In Pyke's experiment there is a closer approach to a normal situation. He exposed nonsense and meaningful groups of letters and measured relative legibility of eight type faces commonly used in England by noting time and errors in oral reading. Four subjects were employed. The author expresses doubt regarding the extent to which results found by him *in the laboratory* hold in everyday reading situations. He emphasizes the fact that slight differences only were obtained and he believes that differences in type faces must be very radical indeed in order to bring about appreciable difference in speed of reading.

## EXPERIMENT ON TYPE FACES

The selection of type faces for the present experiment was based largely upon the replies received from a large number of editors and publishers who were asked to submit suggestions regarding the styles of type faces which should be included. The following type faces were selected on this basis: Caslon Old Style; Scotch Roman; Garamont; Old Style; Bodoni; Cheltenham; and Antique. To these seven type faces were added American Typewriter type, Kabel lite, and Cloister Black to provide striking contrast in type faces to the commonly used styles of type mentioned above. See Figure I for samples of each type face used.

## FIGURE 1.

## SHOWING SAMPLES OF STYLES OF TYPE FACE

| | |
|---|---|
| 1. Mary was sitting on the seashore one hot day in June. She said to her mother, "If only I had brought my skates along, I could have had great fun." | I. Scotch Roman |
| 1. Mary was sitting on the seashore one hot day in June. She said to her mother, "If only I had brought my skates along, I could have had great fun." | II. Garamont |
| 1. Mary was sitting on the seashore one hot day in June. She said to her mother, "If only I had brought my skates along, I could have had great fun." | III. Antique |
| 1. Mary was sitting on the seashore one hot day in June. She said to her mother, "If only I had brought my skates along, I could have had great fun." | IV. Bodoni |
| 1. Mary was sitting on the seashore one hot day in June. She said to her mother, "If only I had brought my skates along, I could have had great fun." | V. Old Style |
| 1. Mary was sitting on the seashore one hot day in June. She said to her mother, "If only I had brought my skates along, I could have had great fun." | VI. Caslon Old Style |
| 1. Mary was sitting on the seashore one hot day in June. She said to her mother, "If only I had brought my skates along, I could have had great fun." | VII. Cheltenham |
| 1. Mary was sitting on the seashore one hot day in June. She said to her mother, "If only I had brought my skates along, I could have had great fun." | VIII. Kabel Lite |
| 1. Mary was sitting on the seashore one hot day in June. She said to her mother, "If only I had brought my skates along, I could have had great fun." | IX. American Typewriter |
| 1. Mary was sitting on the seashore one hot day in June. She said to her mother, "If only I had brought my skates along, I could have had great fun." | X. Cloister Black |

The Chapman-Cook Speed of Reading Tests were used in the identical manner described in previous articles in this series.[4] Form A, was set in Scotch Roman, 10 point, 19 pica line width, set solid, printed on white enamel paper stock, and served as the standard in each comparison. Form B was printed in exactly the same manner except for the variations in type faces shown in Table I. Data are reported for 90 college students in each group, or a total of 900 subjects in all.

## RESULTS

Table I presents the detailed data for each comparison. Results for the ten test groups have been arranged in order from the type face showing the least difference from the standard (Scotch Roman) to the one showing the greatest difference.

Column six contains the significant data with respect to differences. Inspection of these differences shows that all type faces employed in this investigation, with the exception of American Typewriter and Cloister Black (Old English) are equally legible. American Typewriter produces 5.1 per cent reduction in speed of reading whereas Cloister Black retards reading 16.5 per cent.

Apparently type faces in common use are equally legible. This result is not surprising in view of the fact that type faces such as Scotch Roman, Bodoni, Caslon, etc., have survived in competition with hundreds (indeed thousands) of type faces which have been put on the market. The Darwinian theory of "survival of the fit" is beautifully illustrated in the relentless competitive struggle among type faces.

It is significant that an ultra modern type face such as Kabel lite (See Figure I) is practically as legible as

[4] See *Studies of Typographical Factors Influencing Speed of Reading* which have appeared in previous issues of J. Appl. Psychol.

TABLE I

*Influence of Styles of Type Face*

Differences given are for the mean score on Form A, 10 point, 19 pica line width, set solid, Scotch Roman minus the mean score on Form B, 10 point, 19 pica line width, set solid, but varying with respect to styles of type face as indicated in column 2. All test forms were printed on white enamel paper stock. The mean score is the average number of paragraphs of 30 words each in the Chapman-Cook Speed of Reading Tests read in 1¾ minutes. In each test group, N=90 students in sophomore general psychology, the University of Minnesota.

| Test Group | Test Form and Type Face | Mean | P.E.$_{dist.}$ | P.E.$_{M.}$ | Difference Between Means In | | P.E.**$_{diff.}$ | D. / P.E.$_{diff.}$ |
|---|---|---|---|---|---|---|---|---|
| | | | | | Paragraphs* | Per Cent | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| I | A, Scotch Roman | 19.10 | 2.59 | .27 | 0.00 | 0.0 | .15 | 0.00 |
| | B, Scotch Roman | 18.39 | 2.23 | .23 | | | | |
| II | A, Scotch Roman | 18.78 | 2.87 | .30 | —0.07 | 0.5 | .17 | 0.53 |
| | B, Garamont | 18.14 | 2.47 | .26 | | | | |
| III | A, Scotch Roman | 18.81 | 2.66 | .28 | 0.03 | 0.2 | .15 | 0.20 |
| | B, Antique | 18.07 | 2.57 | .27 | | | | |
| IV | A, Scotch Roman | 19.42 | 2.69 | .28 | 0.20 | 1.1 | .18 | 1.11 |
| | B, Bodoni | 18.51 | 2.32 | .24 | | | | |
| V | A, Scotch Roman | 19.03 | 2.72 | .29 | 0.20 | 1.1 | .17 | 1.18 |
| | B, Old Style | 18.12 | 2.37 | .25 | | | | |
| VI | A, Scotch Roman | 18.43 | 3.16 | .33 | 0.23 | 1.3 | .20 | 1.15 |
| | B, Caslon, O. S. | 17.49 | 2.88 | .30 | | | | |

TABLE I (Continued)

| Test Group | Test Form and Type Face | Mean | P.E.$_{dist.}$ | P.E.$_{M.}$ | Difference Between Means In: Paragraphs* | Difference Between Means In: Per Cent | P.E.$_{diff.}$** | D. / P.E.$_{diff.}$ |
|---|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| VII | A, Scotch Roman | 19.06 | 2.65 | .28 | 0.42 | 2.3 | .15 | 2.80 |
| | B, Kabel lite | 17.93 | 2.50 | .26 | | | | |
| VIII | A, Scotch Roman | 18.47 | 2.89 | .30 | 0.44 | 2.5 | .15 | 2.93 |
| | B, Cheltenham | 17.32 | 2.68 | .28 | | | | |
| IX | A, Scotch Roman | 19.50 | 2.35 | .25 | 0.91 | 5.1 | .17 | 5.35 |
| | B, Amer. Typewr. | 17.88 | 2.32 | .24 | | | | |
| X | A, Scotch Roman | 18.51 | 2.43 | .26 | 2.52 | 16.5 | .14 | 18.00 |
| | B, Cloister Black | 15.28 | 1.98 | .21 | | | | |

* The differences in column 6 are "corrected" by the amount of the difference between the mean scores of Form A and Form B of Test Group I which serves as a control group. The "correction" amounts to 0.71 paragraphs for each test group comparison. In view of repeated demonstrations of equivalence of scores on Forms A and B, as reported in our previous articles, it would appear that some systematic error of administration crept into our present experiment. The tests were administered to groups of over 500 students each, and a slight difference in timing or the surreptitious reading ahead in Form A during the fore-exercise might have served to raise spuriously the mean score in Form A. Either one or the other, or both would have operated uniformly to raise the mean scores in all test groups, since the test sets were distributed systematically throughout the auditorium.

** P.E. diff. values in column 8 were computed on the basis of the standard formula for correlated measures. The *r's* for the test groups were: 0.84±.02 for Group I; 0.83±.02 for Group II; 0.85±.02 for Group III; 0.77±.03 for Group IV; 0.81±.02 for Group V; 0.80±.02 for Group VI; 0.84±.02 for Group VII; 0.88±.01 for Group VIII; 0.77±.03 for Group IX; and 0.83±.02 for Group X.

the other type faces in common use. It is possible that Kabel lite might prove to be slightly more legible than the other type faces used in this study were our subjects habituated to reading it. However, in the absence of such habituation, the evidence suggests that there is a slight disadvantage in its use as far as speed of reading is concerned.

The statistically significant retarding effect of American Typewriter type is perhaps due to the inability of typewriter script adequately to adjust the spacing between letters. Thus characteristic word forms are not maintained. Possibly details of letter form are also responsible for lessened legibility.

The extreme loss of legibility exhibited by Cloister Black confirms in a striking manner Starch's dictum that such type "contain too many nooks and corners, too many angles and curly-cues."[5]

The results of the present study are not in agreement with the findings reported by Roethlein, and by Burtt and Basch, but are in close agreement with the conclusions reached by Pyke.

The Roethlein study was a pioneer experiment and, for many years, has greatly influenced writers on the subject. But, as pointed out before, her experiment deals with perceptibility of isolated letters and meaningless groups of letters, and therefore fails to duplicate ordinary reading conditions. In contrast to Roethlein, the present study directly attacks the comparative legibility of type faces in an actual reading situation. For this reason we would emphasize the significance of our findings for the printing industry.

## *Summary*

1. The stress placed upon type face in discussions of typographical factors influencing speed of reading, and

[5] D. Starch, *Principles of Advertising*, A. W. Shaw Company, Chicago, 1923, p. 660.

the failure of any previous investigator to study the question under ordinary reading conditions led to the present study.

2. Ten type faces were compared with respect to their effect on reading rate. Ten groups of 90 college students were tested—a total of 900 subjects.

3. No important differences in rate of reading text material were found when the following type faces were used: Scotch Roman; Garamont; Antique; Bodoni; Old Style; Caslon O. S.; Kabel lite; and Cheltenham.

4. Text printed with American Typewriter type was read 5.1 per cent more slowly than text printed with Scotch Roman type.

5. Cloister Black type (Old English) retards speed of reading 16.5 per cent.

6. Type faces in common use are equally legible.

# THE NATURE AND AIMS OF THE INTRODUCTORY COURSE IN PSYCHOLOGY

A. R. GILLILAND
*Northwestern University*

This is the first of a series of studies of the introductory course in psychology which is being conducted by a joint committee of the Midwestern Psychological Association and the Southern Society of Philosophy and Psychology. Three major problems are being studied by this committee. They are (1) the aims of the introductory course, (2) the subject matter or content of the course, and (3) the methods of instruction. This article will report a study of the aims of the introductory course as now taught in the Middle West, South, and East. It will also include a brief study of some of the characteristics of the course, such as length of the course, amount of laboratory work required in the course, and how the laboratory work is performed.

The territory included in this study is roughly that part of the United States west of the Rocky Mountains. The results will be classified wherever the results are significantly different for the various parts of the country and also for large and small institutions. Under the large institutions were listed all those with approximately two thousand or more students. Where any institution was near the borderline it was placed in the larger group if its department of psychology contained three or more full time instructors.

## THE NATURE OF THE BEGINNING COURSE

The first important problem concerning the introductory course is its length. How many semester hours are

devoted to this course? The following table gives the results for thirty-one large and twenty-five small institutions in the Middle West and South, and for twenty-five large and twenty-one small institutions of the East. We cannot be sure how representative these institutions are. They are the ones answering the questions as submitted. We have more reason for believing that they are representative than that they are not.

TABLE I

*The Length of the Introductory Course in Psychology*

| Lengths of the course expressed in semeter hours | *Middle West and South* | | *East* | |
|---|---|---|---|---|
| | Large Institutions | Small Institutions | Large Institutions | Small Institutions |
| 1 | 0 | 0 | 0 | 0 |
| 2 | 4 | 1 | 0 | 0 |
| 3 | 15 | 10 | 13 | 7 |
| 4 | 3 | 1 | 1 | 4 |
| 5 | 1 | 0 | 0 | 0 |
| 6 | 4 | 10 | 12 | 6 |
| 7 | 0 | 0 | 0 | 0 |
| 8 | 1 | 2 | 0 | 2 |
| 9 | 0 | 0 | 0 | 0 |
| 10 | 2 | 0 | 0 | 1 |
| 11 | 0 | 0 | 0 | 0 |
| 12 | 1 | 1 | 0 | 0 |

Table I shows that, for the large institutions, half the courses in the Middle West and South are for three semester hours and that about a third of the courses for the small institutions are for this length. The other courses in the large institutions vary from two to twelve semester hours, with no one other length greatly predominating. Six semester hours is the second most common length for the small colleges. The six semester hours course is generally a three hour course for the whole year.

The Eastern colleges and universities almost always give either a semester or a year course of three hours

per week. There are almost as many year courses as semester courses.

Several colleges and universities, especially the large universities of the Middle West, give several different introductory courses in psychology. These are often of different lengths, one generally being a year course. The others, no doubt, are often planned to meet the needs of the professional schools and the length is regulated by the needs of the situation.

We also attempted to determine how much laboratory work is performed in the introductory course. The most common answer to this question is none or practically none. More than two-thirds of the instructors from all sections of the country and from both the colleges and universities answered that none or at least less than one hour per week is devoted to laboratory. The only real exception to this is in the case of some of the courses which run for three or more hours for the year.

The question was also asked whether the student does the laboratory work himself or whether the laboratory experiments are demonstrated by the instructor. The answers were not conclusive on this question. In almost one-third of the colleges and universities of the Middle West and South fifty per cent or more of the laboratory work was performed by the student. The percentage was not so large for the instructors reporting from the East.

## AIMS OF THE INTRODUCTORY COURSE

In order to obtain a preliminary list of aims for the introductory course a request was sent to fifteen instructors in the Middle West and South. These were for the most part members of the committee of fifteen previously mentioned. Each submitted a list of aims. Some submitted short lists of a half dozen aims. Others submitted lists of twenty or more. In this list was a statement

of aims as worked out by a group of instructors under the direction of R. M. Elliott at Columbia University.

This large list of aims was classified and duplicates and restatements were eliminated. This left a list of about forty aims. These were later classified as seven major aims with from three to eight sub-aims under each. This list was mimeographed and submitted to instructors for checking. A sample of the list as submitted is presented on the following page.

No great completeness is claimed for this list of aims. Some possible aims probably were omitted from the list, and there certainly is some overlapping between the aims as stated. Some of the sub-aims probably do not belong under the major aims as listed. However, with all these criticisms, the list represents the best opinions of the majority of the committee and gives a fair opportunity for instructors to indicate their aims for the introductory course in psychology.

This list of aims was sent to about a hundred instructors in the Middle West and South and to another hundred instructors in the East. The results of the replies are presented in Table II.

Fifty-seven replies were received from the Middle West and South and fifty-three from the East. The results were weighted, giving three points to first ranks, two to second, and one to third. The results were also tabulated considering first ranks only. There was little difference between the two rankings. In the table all rankings are given in percentages. Percentages for aims and sub-aims were calculated separately. In some cases the percentages in the sub-aims are higher than those in the main aims. This is because a main aim might receive several second and third choices, with a sub-aim under it receiving many first checkings.

There are probably certain factors, such as a favorable or unfortunate statement of an aim, which produce a false emphasis in aims. For example, Aim No. 1 no

TABLE II

*The Questionnaire on Aims in Psychology*

Seven major aims are presented below. Select the *three* of these which you consider most important and number them in the order of importance, letting number 1 represent what you consider the most important aim of the introductory course. Three to eight sub-aims are given under each main heading. Number two, three, or four of these in order of their importance. You need not rate the sub-aims except under the main headings which you have selected as 1, 2, and 3 in importance.

STATEMENT OF AIMS

| | *Middle West & South* | | *East* | |
|---|---|---|---|---|
| | Large Institutions | Small Institutions | Large Institutions | Small Institutions |
| To train students in the scientific method | 25% | 21% | 24% | 30% |
| So that he may see that man's actions are governed by laws | 5 | 7 | 8 | 9 |
| So that he may be able to do straight thinking on psychological problems | 5 | 6 | 5 | 4 |
| So that he may be critical and evaluate psychological data | 3 | 4 | 4 | 4 |
| So that he may solve his own problems by the scientific method | 4.5 | 3 | 1 | 0.7 |
| By stressing the fact that the significant materials of psychology have been obtained by experiment as other sciences | 2 | 4 | 3 | 3 |
| By emphasizing scientific method, using psychological data as subject matter | 1.5 | 0.3 | 1 | 8 |
| So as to combat myth and superstition | 1 | 0 | 2 | 0 |
| To make the student more tolerant | 0.8 | 0.3 | 2 | 2 |
| To prepare the student for a better interpretation of problems in sciences | 5 | 4 | 5 | 6 |
| So that he may be a better educated person | 1.5 | 0.7 | 1 | 5 |
| So that he will look upon man as a biological organism | 2 | 1.2 | 2 | 3 |
| By showing the continuity of living and non-living material | 1 | 0 | 0.7 | 1.5 |
| By showing the continuity of sub-human and human behavior | 1.5 | 1 | 0.2 | 2 |

| | | | | |
|---|---|---|---|---|
| By showing the continuity of living and non-living material | 1 | 0 | 0.7 | 1.5 |
| By showing the continuity of sub-human and human behavior | 1.5 | 1 | 0.2 | 2 |
| It should teach how man grows up from infancy into a normal adult social being | 2.5 | 3 | 1 | 0.2 |
| To teach the facts and principles of psychology so that the student may apply them | 15 | 24 | 11 | 9 |
| So that the student may be a more proficient individual in his chosen field | 8.5 | 12 | 7 | 3 |
| In order to meet the requirements of other departments in a university | 3.5 | 0.7 | 2.5 | 0 |
| In order to fulfill professional requirements such as those of state departments of education | 3 | 3 | 1 | 1.2 |
| In order to fulfill graduation requirements in college | 0.2 | 2 | 0.7 | 0.5 |
| To train students to use psychological knowledge for personal adjustments | 9 | 20 | 11 | 14 |
| In governing his own conduct | 6 | 9.5 | 8 | 10 |
| In governing the conduct of others | 3 | 6 | 4 | 6 |
| So that he may know how to study more effectively | 1 | 2 | 2 | 2 |
| To interest students in psychological problems and methods | 17 | 11 | 18 | 15 |
| To interest them in psychology as a pure science without regard to applications | 8 | 5 | 9 | 4.5 |
| So that the student may read psychological literature | 4.5 | 4 | 5.5 | 4 |
| So that he may take more advanced work in psychology | 4.5 | 2 | 6 | 4.5 |
| So that he may become a psychologist | 1 | 1 | 1.2 | 2.5 |
| To teach the student the amount and importance of individual differences | 4 | 7 | 3 | 5 |
| So that he may appreciate his own resources and handicaps | 1.5 | 2.5 | 2 | 3 |
| So that he may understand human nature as it is | 2.5 | 2.2 | 1.7 | 2.5 |
| So that he may apply his knowledge to selection of employees | 0 | 1 | 0 | 0 |
| So that he may appreciate the accomplishments of others | 1 | 0.7 | 0.5 | 0.7 |
| To satisfy the student's desire to acquire knowledge about psychology in general | 24 | 13 | 28 | 21 |
| In order better to understand the workings of the human mind | 5 | 4 | 3.5 | 5.2 |
| In order better to understand the nature of human behavior | 7 | 5.5 | 8 | 5 |
| In order better to understand normal adult human psychology | 7 | 5 | 8.5 | 7.5 |

doubt received more first rankings than it would have if it had been stated differently. Nevertheless, this table probably gives a pretty fair statement of aims as indicated by their general consistency.

Accepting the data at face value it appears that the major aims of the instructors in large institutions of the Middle West and South are (1) stressing the scientific method, and (2) satisfying the student's interests about psychology in general, with (3) interesting students in psychological problems and methods, and (4) the application of psychology, as rather less popular aims.

The smaller institutions of the Middle West and South ranked the aims in the following order: (1) the applications of psychology, (2) scientific method, (3) psychology for personal adjustments, with (4) satisfying students' interests about psychology in general a poor fourth. This seems to show that the large institutions stress the scientific method and knowledge for its own sake while the smaller institutions stress the applications of psychology and personal service. At least, that is what the instructors say they do and there is probably a definite attempt to do what they say they aim to do. While not tabulated separately in this report, the large southern institutions, with two exceptions, were more like the small institutions than like the large institutions of the Middle West.

The large institutions of the East rank the aims in the following order: (1) satisfying the student's interests about psychology in general, (2) scientific method, (3) interesting students in phychological problems and methods, with (4) applications of psychology and psychology for personal adjustments tied for a poor fourth place. The smaller institutions of the East rank the aims in the following order: (1) scientific method, (2) satisfying student's interest about psychology in general, (3) interesting students in psychological prob-

lems and methods, and (4) psychology for personal adjustments. The large Eastern institutions list aims very similar to those of the large institutions of the Middle West, emphasizing the scientific method and knowledge for its own sake. The applications have even a smaller place than in the Middle West. The smaller institutions of the East have similar aims to those of the large institutions with some greater emphasis upon applications.

No attempt will be made here to summarize the subaims. The data are presented in Table II, and the reader is referred to this table for information on this problem.

A further study of the subject matter taught in the introductory course will throw further light upon the problem of the aims of the course. A study of the methods of instruction will help further in the interpretation of the introductory course. While it is not the purpose of the study to say that these are the aims, the content, and the methods that any instructor should use, the instructor should seriously consider and justify any extensive deviations before adopting them.

## *Summary*

1. About half of the introductory courses in psychology are three semester hours in length. The next most common length is three hours for two semesters.

2. There is little laboratory work in the introductory course except for some demonstrations by the instructor. In a few of the year courses the students do some experiments.

3. The large institutions emphasize the scientific method and knowledge for its own sake.

4. The small institutions emphasize the applications and personal service in psychology.

5. The southern institutions, both large and small, emphasize applications and personal service.

6. The small eastern institutions are similar to the large institutions except for a slightly greater emphasis upon applications and personal service.

# EFFECT OF VARYING PERIODS OF SLEEP ON NERVOUS STABILITY

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For a long time it has been recognized that an individual's nervous stability varies with all sorts of conditions. After performing a fatiguing task he is less steady; after an alcoholic drink he becomes unsteady; with an oversecretion of the thyroid gland he shows a marked nervous instability, and in neurological disturbances involving the basal ganglia, such as paralysis agitans, his nervous stability is reduced to a minimum.

In a series of experiments conducted for the Society of Automotive Engineers[1] it was found that when other conditions are kept constant, there is a diurnal variation of steadiness. Chart 1 shows the curves of nervous instability taken at two hour intervals throughout the day from 8 a.m. to 6 p.m. The chart is expressed in terms of percent of increase in "wabble," or in instability, over the lowest or most stable record. Although most people are of the opinion that steadiness is greatest in the morning, such is far from the case. Actually the most unsteady records are the early morning records, every one of the five subjects making his shakiest record at eight in the morning. Throughout the morning there is a gradual increase in steadiness until two o'clock, after which time steadiness decreases slowly, with a consequent rise in wabblemeter records. Increasing nervous stability until the middle of the afternoon with a gradual

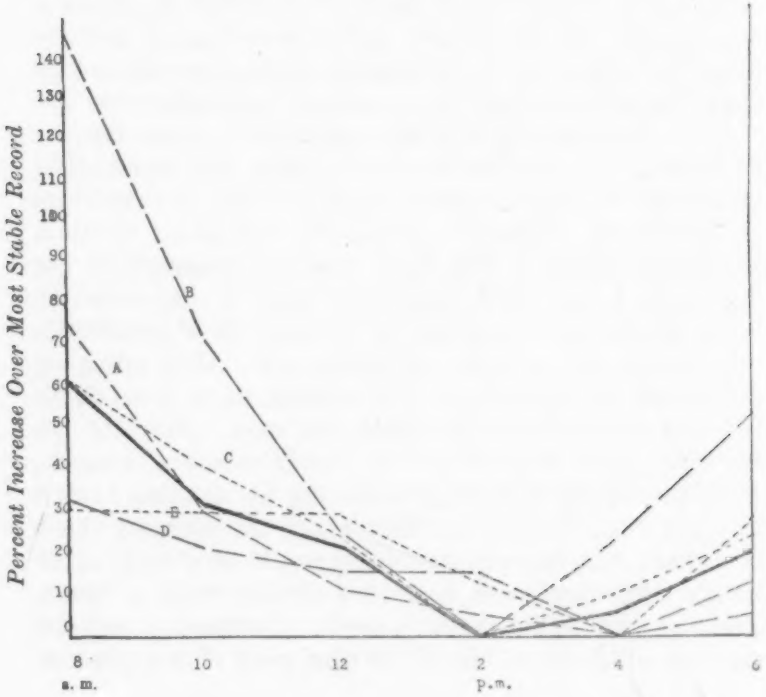
[1] F. A. Moss: *Journal of the Society of Automotive Engineers*, Sept., 1931, pp. 243-246.

decrease after that time is characteristic of the diurnal curves of these five subjects.

In order to extend the diurnal curves of nervous stability into the night hours and to discover what effect varying periods of sleep have on one's steadiness, the present investigation was undertaken.

## CHART 1

PERCENT INCREASE IN WABBLE OVER MOST STABLE RECORD



## METHOD OF PROCEDURE

Five subjects were used in this experiment—three college students and two young teachers. During the three weeks of the experiment they carried on their usual activities with no restrictions except regulation of the hours of sleep. The subjects were given numerous trials of the tests used in the experiment until improvement due to practice ceased. The experiment itself was then undertaken. Tests were made in the early afternoon to get daytime or normal records with which to compare records made after sleep. At bedtime tests were made, and on different nights after having been asleep a determined amount of time the subjects were awakened and put through the battery of tests. Only one series of tests was made each night. For example, one night each subject was awakened and tested after two hours of sleep, another night after four, another after six, and another after eight hours of sleep. The series was run through a second time with the group of five subjects and a third time with three subjects. The figures reported represent averages of the various tests.

## TESTS OF NERVOUS STABILITY

Three tests were used to measure different phases of nervous stability: the wabblemeter, to measure general bodily steadiness; the hand steadiness tester, to measure finer coordination in hand steadiness; and a number checking test to measure alertness of eye, brain and hand.

*Wabblemeter Test:* The Moss Wabblemeter is designed to measure instability or inability to maintain perfect vertical equilibrium. The subject stands on a platform which moves upon a central pivotal point as the weight is shifted from heel to toe or from one foot to the other. Each trial was one minute in length and four trials were given at each testing period, the average of the

four scores being taken as the score for that particular period.

*Steadiness Test:* The apparatus for this test was a standard hand steadiness tester, consisting of an electric stylus to be held in a small hole in a metal sheet, without touching the sides of the hole. Every touch makes an electrical contact which is registered on an electric counter. Four trials of 45 seconds each were given at each test period.

*Number Checking:* Sheets of paper containing one thousand numbers, a hundred of each digit arranged in chance order, were given the subject with instructions to check each occurrence of a certain number as rapidly as possible until time was called. At each testing period two numbers, 5 and 3, were checked, and two 45 second trials were given for each number.

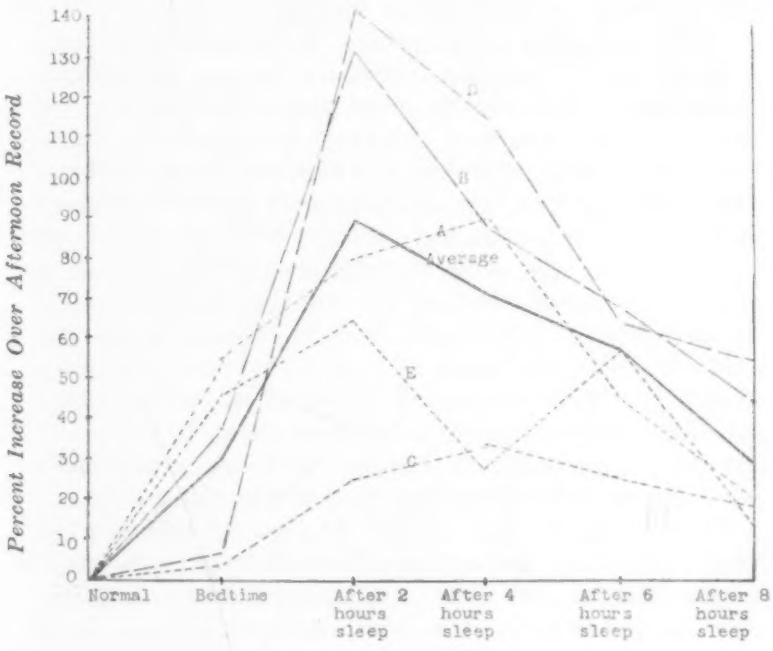
## RESULTS

The results obtained from use of each of the three tests may best be considered separately, although in general all tests bear out the same conclusions.

Chart 2 shows the percentage of increase in wabble over the normal afternoon wabblemeter records. Readings were made at bedtime and on different nights after two, four, six and eight hours of sleep. Each percentage represents the average of at least eight trials on the wabblemeter. In every case nervous stability decreased from the afternoon test period to the test made at bedtime; the decrease in stability being indicated by an increase in "wabble" and a consequent rise in wabblemeter readings. In every case, also, the period of greatest instability occurs after from two to four hours of sleep; in three cases after two hours of sleep, and in the other two cases after four hours. After four hours steadiness increases with each succeeding hour, and tests made after eight hours of sleep show a steadiness record substantially the equivalent of the record made just

## CHART 2

PERCENT INCREASE IN WABBLE OVER AFTERNOON RECORD




before going to bed. It thus appears that there is a definite nocturnal as well as diurnal curve of general bodily stability, with relatively great instability at the two extremes of the day, with the period of greatest stability in the early afternoon, and the period of greatest instability at the corresponding hours of the night.

The only inconsistency in results appears in the record of subject E. One night after six hours of sleep she showed an extreme decrease in stability, making by far

the poorest record she ever made on every test. For that reason in each test her curve shows two peaks instead of conforming to the type seen in those of the other subjects. Neither she nor I could account for the inconsistency. On a previous trial after six hours of sleep she had made a much better record.

Chart 3 shows the percentage of increase in contacts with the hand steadiness tester, an increase in contacts indicating a decrease in steadiness. In general, the curves for steadiness of the hand are similar to those for general bodily stability as measured by the wabblemeter, although they are less consistent due to the greater variability of scores on the different trials at one testing period. This test is very much less satisfactory as a measure of steadiness than the wabblemeter because of its unreliability. However, certain definite trends are evident. After two hours of sleep all subjects were very unsteady. With succeeding hours of sleep steadiness increased, four of the five being more steady in the morning than upon going to bed at night, while two were more steady in the morning than at any other hour.

Chart 4 shows the percent of loss of efficiency in number checking, taking the afternoon tests as the standard. This test, involving eye-brain-hand co-ordination, contains an element of mental alertness as well as of muscular control, whereas the former tests were entirely neuro-muscular. In this test as in the other two we find evening records less efficient than afternoon ones, with least efficiency of all after two hours of sleep, more after four, even greater efficiency after six, and a morning record similar to that made at bedtime.

Individual differences in nocturnal stability are very marked. Subject C showed considerable instability in morning tests as compared with evening tests while

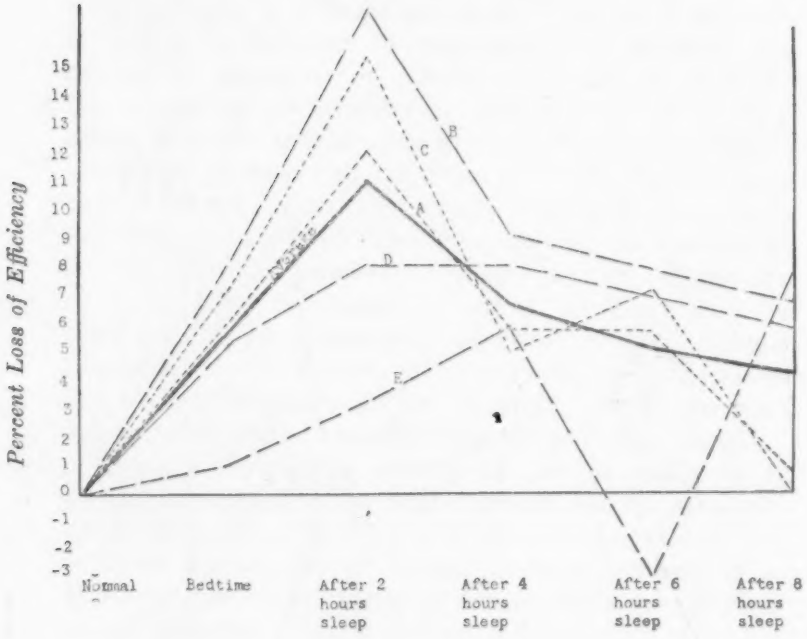
## CHART 3

PERCENT INCREASE IN HAND UNSTEADINESS OVER AFTERNOON RECORD

*Percent Increase Over Afternoon Record*

## CHART 4

PERCENT LOSS OF EFFICIENCY IN NUMBER CHECKING COMPARED WITH AFTERNOON RECORD



the others were more efficient in the morning. Subject C likewise showed little variability in performance from time to time, while Subject B was extremely variable, falling off markedly in efficiency when wakened at night.

Chart 5 presents a summary of the three tests. Curve X gives the average increase in instability as measured by the wabblemeter test; curve Y the increase in instability shown in use of the hand steadiness apparatus; and curve Z the decrease in efficiency in eye-hand co-ordination in number checking.

## CONCLUSIONS

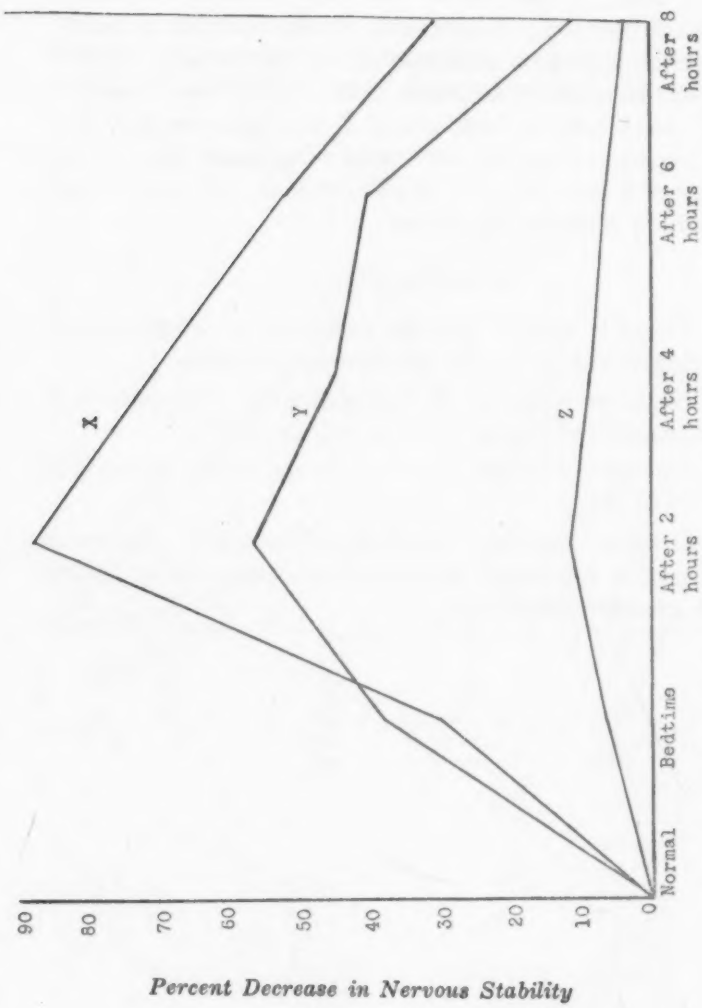
1. There is a close relation between the length of the preceding period of sleep and nervous stability.

2. Nervous stability is far less after two hours of sleep than at bedtime after a strenuous day.

3. Nervous stability increases with increasing amounts of sleep.

4. Greatest nervous stability is found in the early afternoon, a warming up period evidently being essential to greatest efficiency.

## CHART 5




Curve X represents increase in "wabble".
Curve Y represents increase in hand unsteadiness.
Curve Z represents loss of efficiency in number checking.

Curve X represents increase in "wabble".
Curve Y represents increase in hand unsteadiness.
Curve Z represents loss of efficiency in number checking.

# MENTAL TRAITS OF THE CHILDREN OF OIL INDUSTRY WORKERS

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Mount Pleasant, a city of some 5,000 or so, is situated in the center of one of Michigan's oil fields. Its native population, dating for the most part back to the heydey of the lumber era and thence to New England, felt distinct social disturbances at the changes brought about by an oil boom which reached its height sometime during 1930. Its interests, previously very much centered about the Central State Teachers College (enrollment about 900 in 1930) were suddenly shifted to oil leases, wells and thoughts of sudden and miraculously acquired wealth (mostly imaginative). Its shops multiplied and flourished during a time when most of those elsewhere were complaining of the depression. Rents rose to unprecedented heights to the consternation of oil worker and school man alike. When I first went there in 1929 there was a general plaint on the part of teachers in the college and city system, most of whom were renters, against the oil workers because of the increase in rentals and the decrease in the number of desirable places available. It was commonly charged that the oil workers had taken the most desirable places and that they were responsible for the increase in rentals. The administration of the college, confronted with the problem of finding rooms, apartments and houses for a large percentage of its students, quite openly lamented the oil boom, because of both the higher rents and increased difficulty in securing desirable places. Landladies who previously could be dic-

tated to in matters of repairs, number of students per room, heat, light and cleanliness, now brooked regulation from no one. Nor were the complaints of the native population confined to matters of rentals. It was commonly charged that the oil workers were an undesirable lot, possessed of low standards of living, crudities of cultural taste, immoral and dishonest habits.

The oil worker, on the other hand, had a grudge of his own: "He was discriminated against in the matter of rentals, supplies and credits. He was a social outcast and need scarcely expect fair treatment in the local courts. If tried he would be convicted, and if convicted, given a stiff sentence for offenses ignored when coming from scions of the local families."

These social disturbances led me to an examination of their effects upon the children in the public schools and upon the schools themselves. What were the children of the oil workers like? What was the attitude of the school towards them? Had their school work suffered as a result of frequent moves incident to association with the oil industry? What was their informational and intellectual background? Their home conditions? Their physical status? Their trustworthiness in test situations? Their self-evaluation? And what did their teachers think of them in terms of citizenship, study habits, leadership, adjustment to the social group, and in emotional stability? In making appraisals, comparisons are between the children of those associated with the oil industry (called Oil), and children from families not so associated (called Local). Wherever possible comparisons are given in terms of national or well-established norms. Table I locates the children by group, sex, and grade, a total of 108 Oil and 498 Local children.

TABLE I

*Location of Children by Grade, Sex and Group*

| Grade* | Oil Boys | Oil Girls | Local Boys | Local Girls |
|---|---|---|---|---|
| 1.9 | 4 | 9 | 36 | 41 |
| 2.9 | 3 | 7 | 29 | 23 |
| 3.9 | 10 | 7 | 42 | 42 |
| 4.9 | 4 | 10 | 31 | 32 |
| 5.9 | 7 | 11 | 22 | 34 |
| 6.9 | 3 | 7 | 31 | 30 |
| 7.9 | 2 | 8 | 26 | 31 |
| 8.9 | 6 | 10 | 25 | 23 |
| Totals | 39 | 69 | 242 | 256 |

* Tests were given in May 1931, hence grade 1.9, 2.9, 3.9, etc.

It will be noted that there is a much larger percentage of girls in the Oil group than in the Local, or than is the usual expectancy. No satisfactory explanation for this is available. It is discussed more fully later (p. __).

While this investigation was under way, but before he could be tested, one third-grade boy from the Oil group left to go, presumably, to his twenty-third school. Transitory school experience of this type emphasizes the importance of securing data on children whose school work is interrupted by frequent transfers. Opinion is quite general among children and parents that a child is discriminated against as regards grade placement and school marks when he transfers to a new school. This study indicates that such is not the case with respect to grade placement so far as age and informational background are concerned (see p. __). Table II gives the percentages of both groups having lived (including Mount Pleasant) in one, two, three, etc., number of communities.

TABLE II

*Percentages of Children Having Lived in Various Numbers of Communities*

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oil (%) | 0.0 | 21.4 | 26.8 | 28.5 | 13.4 | 5.4 | 1.8 | .9 | .9 | | .9 |
| Native (%) | 45.7 | 27.0 | 13.2 | 9.6 | 3.1 | 1.1 | .3 | | | | |
| Mean No. of Communities Lived in: | | | | | | d | | | | | |
| Oil Children | | | 3.74, $\sigma$ .15 | | | $\frac{\sigma d}{10.8}$ | | | | | |
| Local Children | | | 2.02, $\sigma$ .07 | | | | | | | | |

Since grade and age groups of oil children are too small to warrant detailed comparison (see Table I), total group populations are compared. Table III summarizes the data for life age, test age, IQ and retardation by group and by sex. Test age is based on New Stanford Achievement test data for grades three to eight inclusive and upon Stanford Binet scores for grades one and two. The use of these two tests (one called an Achievement test and the other called an Intelligence test) as measures of the same elements is justified by their close relationship (see Kelley, *The Interpretation of Educational Measurements*, Chapter 8). The IQ's, it will be observed, are subject to the same limitations for both tests. Retardation is figured relative to the life age of the child in relation to Stanford Achievement Test Norms for grades three to eight inclusive and from Pintner-Cunningham Primary Test Norms for the first two grades. In all instances it is in terms of months or grades that a child is retarded or accelerated from the average of his age group. The term "accelerated" is used in preference to any other because both groups of children were, on the average, somewhat advanced as compared with the norms used. Standard deviations of the means are given in connection with the averages together with the quotients of mean differences divided by their standard deviations (quotients approximating zero are omitted).

TABLE III

*Means of Life Age, Test Age, IQ and Acceleration*

(See preceding paragraph for explanation of terms)

| | Life Age (mos.) | $\frac{d}{\sigma d}$ | TestAge (mos.) | $\frac{d}{\sigma d}$ | IQ | Acceleration (mos. life age) | $\frac{d}{\sigma d}$ |
|---|---|---|---|---|---|---|---|
| Oil Boys | 134.0,$\sigma$4.8 | | 133.0,$\sigma$4.2 | | 99.5 | 0.00,$\sigma$1.20 | |
| Oil Girls | 129.5,$\sigma$3.8 | .7 | 134.2,$\sigma$3.7 | .2 | 103.7 | 8.50,$\sigma$1.10 | 5.2 |
| Local Boys | 128.5,$\sigma$2.1 | | 129.1,$\sigma$1.9 | | 100.5 | 3.50,$\sigma$ .68 | |
| Local Girls | 129.4,$\sigma$2.0 | .3 | 130.6,$\sigma$1.6 | .6 | 100.9 | 3.60,$\sigma$ .57 | |
| Oil Boys | | 1.1 | | .9 | | | |
| Local Boys | | | | | | | 2.2 |
| Oil Girls | | | | .7 | | | 3.9 |
| Local Girls | | | | | | | |
| Total Boys | 129.2,$\sigma$1.8 | | 129.6,$\sigma$1.6 | | 100.3 | 3.80,$\sigma$ .64 | |
| Total Girls | 129.4,$\sigma$1.5 | | 131.2,$\sigma$1.4 | .8 | 100.1 | 5.60,$\sigma$ .61 | 1.9 |
| Total Oil | 131.3,$\sigma$3.1 | .8 | 134.2,$\sigma$2.6 | 1.9 | 101.5 | 5.60,$\sigma$ .85 | 1.0 |
| Total Local | 128.7,$\sigma$1.4 | | 128.7,$\sigma$1.4 | | 100.0 | 4.30,$\sigma$ .56 | |

According to these data there are few reliable differences between boys and girls or between oil and local children with reference to life age, test age or IQ. Marked acceleration of the girls in the oil group is apparent and out of keeping with the slight advantage they hold in test age and in IQ. There is no reason to believe, as has been frequently charged, that the oil children are discriminated against in matters of grade placement or that their schooling has suffered from frequent changes in schools. If there is any effect, it is in the other direction, a finding considerably out of harmony with most educational theory.

Thirteen home-room teachers (3 men and 10 women) rated each of the children in his home room as A, B, C, D or E on Citizenship, Study Habits, Leadership, Adjustment to the Social Group, and Emotional Stability. No attempt was made at defining the terms and no measure of the reliability of the ratings is available. It was thought that these ratings, in addition to giving an indi-

cation as to the nature of the children concerned (both Oil and Local), would describe the attitude of the teacher towards children of the oil workers as a class. These ratings reveal marked sex differences but no group differences of any magnitude.

Of all the "A" ratings given (322 in number) boys received only 116 and girls received 206, a ratio of 9 to 16, or only 36 per cent of the A's while they made up 46.5 per cent of the total population. Taking ratings on all traits into consideration, boys averaged .05,$\sigma$.03 and girls .26,$\sigma$.03 ($\frac{d}{\sigma_d} = 5.3$), computed with A = 2, B = 1, C = 0, D = —1, E = —2.

Possibly these differences in teachers' ratings are due as much to characteristics of teachers as to trait differences between the sexes. A thorough description and interpretation awaits more extensive investigation. Data on trustworthiness and over- and under-estimation fail to reveal sex differences of the magnitude or general nature claimed by teachers' ratings.

Table IV gives comparisons by sex and group on the basis of teachers' ratings on the five trait characteristics listed. The data show the marked favor with which girls are viewed by their teachers in citizenship, study habits and emotional stability. The oil children are rated as superior to the local children with respect to study habits, leadership and adjustment to the social group, irrespective of sex. Wider and more varied experiences of the oil children might reasonably account for the advantage they seemingly hold in leadership and adjustment to the group (see Table II). That, despite their frequent change of school situation, they are rated as superior to the local children in study habits, furnishes ample room for speculation as to the causative factors. Means, standard deviations of these means, and mean differences divided by their standard deviations are given in Table IV.

TABLE IV

*Means of Teachers' Ratings on Trait Characteristics**

(A = 2, B = 1, C = 0, D = —1, E = —2)

| | Citizen-ship | d / σd | Study Habits | d / σd | Leader-ship | d / σd | Adjustment to group | d / σd | Emotional Stability | d / σd |
|---|---|---|---|---|---|---|---|---|---|---|
| Oil Boys | .25,σ.11 | | .04,σ.14 | | .21,σ.09 | | .28,σ.13 | | .15,σ.09 | |
| Oil Girls | .72,σ.12 | 2.9 | .63,σ.11 | 3.3 | .29,σ.08 | .7 | .52,σ.09 | 1.5 | .45,σ.09 | 2.4 |
| Local Boys | .24,σ.07 | | —.14,σ.06 | | —.23,σ.07 | | .05,σ.07 | | .12,σ.07 | |
| Local Girls | .68,σ.09 | 3.9 | .31,σ.06 | 5.3 | —.04,σ.07 | 1.9 | .24,σ.06 | 2.1 | .41,σ.09 | 2.5 |
| Oil Boys / Local Boys | | .1 | | 1.2 | | 3.9 | | 1.6 | | .3 |
| Oil Girls / Local Girls | | .3 | | 2.5 | | 3.1 | | 2.6 | | .3 |
| Total Boys | .24,σ.06 | | —.12,σ.06 | | —.17,σ.07 | | .08,σ.06 | | .12,σ.06 | |
| Total Girls | .69,σ.05 | 5.8 | .38,σ.06 | 5.9 | .03,σ.06 | 2.2 | .30,σ.05 | 2.8 | .34,σ.09 | 3.9 |
| Total Oil | .55,σ.08 | | .42,σ.09 | 3.2 | .26,σ.09 | 3.8 | .43,σ.09 | 2.8 | .34,σ.09 | .7 |
| Total Local | .47,σ.04 | .9 | .09,σ.05 | | —.13,σ.05 | | .15,σ.04 | | .27,σ.05 | |

* The product-moment correlations between ratings on various traits in order as they appear in the caption (citizenship-study habits, citzenship-leadership, citizenship-adjustment to group, etc.) are: .47, .38, .55, .37, .56, .29, .48, .36, .46 (N = 606). These coefficients are consistent with expectation inasmuch as, when corrected for attenuation they permit of reliabilities of ratings in the neighborhood of .50.

Further check on character and personality traits was made through two tests: "Circles and Squares" (Terman's adaptation, Genetic Studies of Genius, Vol. I, p. 497ff.), and an over-under estimation test. The Circles and Squares test was administered and scored exactly as outlined by Terman. The over-under estimation test constituted a situation whereby the child was asked whether he could spell certain words after which he was given a spelling test to determine if he actually could spell them. The words of the Dictation test of the New Stanford Achievement Test, Form X, with an addition of easier words at the lower end for first and second graders, comprised the spelling test. Check sheets with consecutive numbers from one to 110 were handed to each child. He was instructed to write *yes* after the number of a word if he could spell it and *no* after the number if he could not spell it. Each word was pronounced clearly and as many times as the child wished. No suggestion was given relative to making high scores and no caution was given about honesty. Immediately after reading the words they were given as a dictation test (all in sentences). Check was then made of the number of words a child said he could not spell and yet did spell (called under-estimation) and of the words he said he could spell but did not spell (called over-estimation). Summary of the data from these two tests is given in Table V.

Fairly consistent sex differences are noted, boys being somewhat more trustworthy than girls, less inclined to under-estimation of what they can spell and more inclined to over-estimate. Consistent group differences are lacking, though the local girls are more inclined to both under- and over-estimation of what words they can spell. Neither age nor informational background can account for the sex differences noted (see Tables III and IV). It is of interest that on the Circles and Squares Test these children, averaging in life age slightly under eleven

years, score practically the same as Terman's control group of that age.

The conclusion from these data would be that teachers rate girls higher than boys (see Table IV) because of their own attitudes rather than because of character differences between the sexes. Table V gives mean scores on the character and personality tests together with standard deviations of these means and mean differences divided by their standard deviations.

TABLE V

*Mean Scores of Character and Personality Tests*

| | Circles and Squares | | Under-Estimation | | Over-estimation | |
|---|---|---|---|---|---|---|
| | M | $\frac{d}{\sigma d}$ | M | $\frac{d}{\sigma d}$ | M | $\frac{d}{\sigma d}$ |
| Oil Boys | 46.7,σ4.6 | | .90,σ.4 | .3 | 27.15,σ2.9 | 2.1 |
| Oil Girls | 53.4,σ4.0 | 1.1 | .74,σ.3 | | 19.92,σ2.0 | |
| Local Boys | 46.9,σ2.6 | | .98,σ.1 | | 22.80,σ1.0 | 1.3 |
| Local Girls | 53.8,σ2.4 | 2.0 | 1.80,σ.2 | 5.1 | 21.00,σ .9 | |
| Oil Boys | | | | | | 1.4 |
| Local Boys | | | | .2 | | |
| Oil Girls | | | | | | |
| Local Girls | | | | 3.0 | | .5 |
| Total Boys | 46.9,σ2.3 | | .97,σ.1 | | 23.61,σ1.0 | 2.0 |
| Total Girls | 53.7,σ2.1 | 2.2 | 1.24,σ.2 | 1.6 | 20.76,σ .9 | |
| Total Oil | 51,0,σ3.1 | | .80,σ.3 | | 22.53,σ1.8 | |
| Total Local | 50.6,σ1.8 | | 1.45,σ.1 | 2.1 | 22.03,σ .7 | |

Of general interest is the tendency of all groups to over estimate markedly rather than to under-estimate their ability to spell.

Each of the children in the schools from which our subjects come is examined, at least annually, by the county nurse. Headings under which defects are listed include: vision, speech, hearing, nutrition, tonsils and adenoids, mouth, teeth, glandular, fits, bronchial, spinal, tics, crippled, and general health. Fourteen per cent of

the oil children are checked as having one or more serious physical defects while the percentage of local children so checked is 22.

Our data show that 45 per cent of the local children and 69 per cent of the oil children live in rented homes. The average size family in which the local children live is 6.64,$\sigma$.1. For the oil children the average size family is 7.19,$\sigma$.2 ($\frac{d}{\sigma_d} = 2.3$). The average number of rooms occupied per family is, for the local families, 7.19,$\sigma$.2 and for the oil families, 5.72,$\sigma$.3 ($\frac{d}{\sigma_d} = 4.7$). Thus families of the oil workers had .78 rooms per person in the family while local families occupied, on the average, 1.08 rooms per person.

Fifteen per cent of the oil children are in families where the father is away from home. For the local children this percentage is seven. Mothers of only four per cent of the oil children work outside of the home while mothers of 14 per cent of the local children work outside of the home. It is of particular interest that one per cent of the local children and 13 per cent of the oil children live in shacks thrown up on land belonging to or leased by the oil company for which the family pays no rent. Such persons are called "squatters." One family of oil workers comprising the parents and eight children lived in a one-room shack in this manner at the time of our investigation.

## SUMMARY

Children of the workers in one of Michigan's oil fields give no indication of inferiority in physique, mental ability, accomplishment or character, nor is there any evidence that they are discriminated against in any particular in the public schools they attend. They are freer from physical defects than are the local children. They are rated by their teachers as superior to the local children in study habits, leadership and adjustment to the

social group. They are markedly accelerated in grade placement over the local children on the bases of both life age and informational background. The fairness with which they are viewed by their teachers is evidence of the freedom of these teachers from the group prejudices so common in the community at large at the time these data were secured.

Marked sex differences in teachers' ratings are noted, especially in citizenship and study habits. These are it is believed differences of attitudes on the part of the teachers rather than character differences between the sexes. Test data show no superiority of accomplishment on the part of the girls. On the Circles and Squares Test they evidenced less trustworthiness than did the boys. They were less inclined to over-estimation of their ability to spell and more inclined to under-estimation, however.

# AN EXPERIMENTAL TEST IN EVALUATING THE MOST ESSENTIAL QUALIFICATIONS FOR THE POSITION OF "OFFICE CLERK"

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There appears to be an assumption that in writing up a set of employment specifications the supervisory officer's judgment in fixing minimum requirements and essential qualifications reflects the consensus of opinion. To determine whether persons of good judgment and experience can substantially agree as to the essential qualifications for a position, the questionnaire on the next following page was filled out by thirty judges. The position selected was that of "office clerk," and the judges were instructed to interpret this to mean not a person performing some specialized clerical service but one who performs work of a general routine clerical nature—an "office clerk" as generally understood by the average person, by the "man in the street." Table 1 contains the results of the experiment, followed by comments.

This experiment adds a little more evidence to that already accumulated through the results of many previous experiments by various investigators to prove that human judgment taken individually is just as likely to be highly erratic as it is to be highly consistent, but that the pooling of a number of judgments does produce a fairly satisfactory degree of reliability and consistency.

## THE QUESTIONNAIRE

Of the following qualifications, which *five* do you regard as the most essential for an office clerk to possess? Number them from 1 to 5 in the order of your choice.

1_____Male
2_____Female
3_____Single
4_____Married
5_____Under 45 years of age
6_____High school graduate
7_____Some clerical experience
8_____Several years' clerical experience
9_____Pleasing personality
10_____Neat appearence
11_____Quick and active
12_____Slow and careful
14_____Sunny disposition
15_____Sobriety
16_____Industry
17_____Honesty
18_____High degree of abstract intelligence
19_____Good handwriting
20_____Knowledge of current events
21_____Ability to learn new work easily
22_____Quick and accurate at figures
23_____Good memory
24_____Willingness to accept responsibility
25_____Skillful in operating office appliances
26_____Thorough knowledge of filing
27_____Good judgment
28_____Knowledge of business terms, abbreviations, postage rates, business papers and forms, etc.
29_____Knowledge of bookkeeping
30_____Knowledge of typewriting or stenography

If there are other qualifications, not listed above, which you would regard as more essential than those above, describe them in the lines below.

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Table I shows the five most essential qualifications that an "office clerk" should possess. The order of choice for each judge is indicated by the figures 1 to 5 shown underneath the various qualifications.

The "Index of Preference" is the weighted total points for each qualification, and is used merely to show the

TABLE No. 1

| Judges | Index of Preference | Honesty. | Good judgment. | Ability to learn new work easily. | Industry. | High school graduate. | Pleasing personality. | Willingness to accept responsibility. | Under 45 yrs. of age. | High degree of abstract intelligence. | Some clerical experience. | Good memory | Neat appearance. | Good handwriting. | Quick and active. | Several years' clerical experience. | Skillful in operating office appliances. | Quick and accurate at figures. | Knowledge of stenography and typewriting. | Sobriety. | Thorough knowledge of filing. | Single. | Married. | Male. | Female. | Slow and careful. | Sunny disposition. | Knowledge of current events. | Knowledge of business information, etc. | Knowledge of bookkeeping. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 75 | 57 | 56 | 56 | 40 | 27 | 25 | 20 | 16 | 13 | 9 | 9 | 8 | 8 | 8 | 6 | 5 | 5 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| A | 1 | 1 | 2 | 3 | 5 | | | | | | 4 | | | | | | | | | | | | | | | | | | | |
| B | 2 | | 1 | 3 | | | | 5 | 4 | | | | | | | | | | | | | | | | | | | | | |
| C | 1 | | 5 | 4 | 2 | | | | 3 | | | | | | | | | | | | | | | | | | | | | |
| D | 1 | 1 | 4 | 3 | 2 | | | | | | | | | | | | 5 | | | | | | | | | | | | | |
| E | 1 | 1 | 3 | | 4 | | 2 | | | | 5 | | | | | | | | | | | | | | | | | | | |
| F | 1 | | 3 | 2 | | | | 5 | | | | 4 | | | | | | | | | | | | | | | | | | |
| G | | | 4 | 1 | 2 | 5 | | 3 | | | | | | | | | | | | | | | | | | | | | | |
| H | 3 | | 5 | | 4 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | |
| I | 5 | | | 3 | 4 | 2 | 4 | | 1 | | | | | | | | | | | | | | | | | | | | | |
| J | 1 | | | | 2 | 4 | 3 | | | | | | | | | | | | 5 | | | | | | | | | | | |
| K | 3 | | 4 | 1 | 3 | 2 | | | 5 | | | | | | | | | | 2 | | | | | | | | | | | |
| L | | | 4 | 5 | 3 | 2 | 1 | | | | | | | | | | | | | | | | | | | | | | | |

TABLE No. 1—(Continued)

| | Honesty. | Good judgment. | Ability to learn new work easily. | Industry. | High school graduate. | Pleasing personality. | Willingness to accept responsibility. | Under 45 yrs. of age. | High degree of abstract intelligence. | Some clerical experience. | Good memory | Neat appearance. | Good handwriting. | Quick and active. | Several years' clerical experience. | Skillful in operating office appliances. | Quick and accurate at figures. | Knowledge of stenography and typewriting. | Sobriety. | Thorough knowledge of filing. | Single. | Married. | Male. | Female. | Slow and careful. | Sunny disposition. | Knowledge of current events. | Knowledge of business information, etc. | Knowledge of bookkeeping. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | 1 | 3 | | | | 4 | 2 | | | | | | | | | | | | | | 5 | | | | | | | |
| N | 1 | | | 2 | | 5 | | 4 | | | | | | | | | | | 3 | | | | | | | | | |
| O | 1 | 4 | 5 | | | | | | | | | | 2 | | 3 | | | | | | | | | | | | | |
| P | 1 | 4 | 5 | | | | | | 2 | | | | | | | | 3 | | | | | | | | | | | |
| Q | | 5 | 2 | 4 | 1 | | | | | | | | | 3 | | | | | | | | | | | | | | |
| R | 3 | 2 | | | 1 | | 4 | | | | 5 | | | | | | | | | | | | | | | | | |
| S | | 1 | 2 | | 4 | | 3 | | | | | | | 5 | | | | | | | | | | | | | | |
| T | | 5 | 3 | 1 | | | 4 | | 2 | | | | | | | | | | | | | | | | | | | |
| U | | 1 | 4 | | | 3 | 2 | | | | | | | | | 5 | | | | | | | | | | | | |
| V | | | 2 | 1 | 4 | | | 3 | | 5 | | | | | | | | | | | | | | | | | | |
| W | 1 | | 4 | | | | | | 2 | | | 3 | 5 | | | | | | | | | | | | | | | |
| X | 3 | | | 2 | | | | 4 | | | | | | | 1 | 5 | | | | | | | | | | | | |
| Y | 3 | | 5 | | | | | 4 | | 2 | | 1 | | | | | | | | | | | | | | | | |
| Z-1 | | | 4 | 3 | 1 | | | | | 2 | | | | | | 5 | | | | | | | | | | | | |
| Z-2 | | | 3 | | 1 | | 5 | | 2 | | | | | | | | 4 | | | | | | | | | | | |
| Z-3 | | 2 | | 1 | | | | | | | 3 | 5 | 4 | | | | | | | | | | | | | | | |
| Z-4 | | | | 4 | | 1 | | | | 5 | 3 | | | 2 | | | | | | | | | | | | | | |
| Z-5 | | 1 | | | | | 2 | | | | | | 5 | | | 4 | | | | 3 | | | | | | | | |

relative importance of the qualifications in the opinion of these judges.

The qualifications are listed here in the order of their preference by these judges, "honesty" being regarded as the most essential, "good judgment" as the next most essential, and so on.

## COMMENTS

(1) If we compare the qualifications chosen by one judge with the qualifications chosen by each of the other judges, it is found in a number of cases that some pair of judges did not agree on even one single qualification as belonging among the five most essential, the one judge having selected five qualifications entirely different from the five selected by the other judge.

(2) Qualification No. 28 (knowledge of business terms, abbreviations, postage rates, business papers and forms, etc.) was not selected in a single instance by any of the thirty judges. Why do civil service examinations for clerks, as well as most of the "standardized" clerical tests in both public and private employment, include as an important and often principal part of the examination elaborate tests to determine if the candidates possess qualification No. 28?

(3) A filing test is usually considered of importance in examinations for clerical positions, but out of thirty possible choices the qualification "thorough knowledge of filing" was selected only once.

Similarly it seems that it is not essential for a clerk to be "correct and accurate at figures," "skillful in operating office appliances," have "good handwriting" or a "good memory" or a "high degree of abstract intelligence," as these were selected only from three to six times out of a possible thirty.

(4) Of the five judges who are in greatest disagreement with the average opinion, four of them had no experience in hiring or supervising employes; while of the

five judges who agreed most closely with the average opinion of the thirty judges, four of them were experienced in supervising employes.

(5) Among the thirty judges seven were women, some with experience and others without experience as supervisors. Computing the weighted average for these seven women judges the results show that their choice of the five most essential qualifications are Nos. 6, 27, 21, 17, and 16 respectively. All of these qualifications agree with the average opinion of the thirty judges taken as a whole except that the average opinion of the seven women judges places qualification No. 6 in first place instead of in fifth place.

(6) Dividing the judges into three groups of ten each (based on random selection—not in the order shown), we find according to the weighted average for each group of ten that there is substantial agreement in choosing the five most essential qualifications, as follows:

| | Order of Choice | | | | |
|---|---|---|---|---|---|
| | 1st | 2d | 3d | 4th | 5th |
| The first ten judges selected qualifications | 17 | 21 | 27 | 5 | 6 |
| The second ten judges selected qualifications | 16 | 27 | 17 | 21 | 6 |
| The third ten judges selected qualifications | 17 | 16 | 9 | 27 | 6* |
| The thirty judges selected qualifications | 17 | 27 | 21 | 16 | 6 |
| The seven women judges selected qualifications | 6 | 27 | 21 | 17 | 16** |

* Tied with 21 for fifth choice.

** Tied with 11 for fifth choice.

NOTE: The qualification numbers shown in the tabulation above refer to the qualifications as numbered on page 645.

# THE MENTAL GROWTH OF DULL ITALIAN CHILDREN

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During recent years the problem of mental growth has become recognized as one of the most difficult problems with which the parent and school have to deal. As mental growth probably has its basis within the structure of the nervous system it becomes greatly influenced by heredity and the environment in which the individual lives. Neurology should give a great deal of help in solving some of the vital problems of mental growth. Probably one of the reasons for the limited amount of data in this field is due to the slow and uncertain development of the technique and scales for scientific measurement. We realize that the existing technique is subject to many errors and variations but we maintain that the results of this study show a fairly accurate and significant trend which should suggest some possibilities to educators who are dealing with the problems of dull children.

We shall not be able to discuss the questions of how much the child grows in less than a period of twelve months or between the intervals of measurement, the angle of the growth curve at the different ages, or the problem of the end-point of growth of dull children. We shall make no attempt here to predict the mental growth beyond the ages measured for this study. Neither shall we try to defend the validity of the mental tests used other than to say they are well standardized and are generally accepted as fairly accurate scales for the measurement of the intelligence of public school children. Wentworth's study shows that results obtained from the tests

used are reliable in correlation with the Stanford Revision of the Binet Simon test.[1]

The beginning of the scientific study of mental growth dates back to the work of Binet who devised an objective scale to measure the intelligence of children. After he gave to the psychologists the concept of mental age much progress has been made toward the scientific construction of mental tests and their administration to school children. The writer will mention a few investigations of mental growth and refer the reader to a former article for a more comprehensive review of previous investigations.[2]

Powell[3] studied the retest data of 126 subjects in the children's hospital, Randall's Island. The interval between tests varied from six months to three years, and the IQ's ranged from 20 to 90. She found an increase in IQ of 1.08 points and concluded that mental defectives are not more variable than normal children. The variation in this study is lower than any we have been able to find. We are inclined to believe that this small variation is more of an exception than the general findings from retests.

Garrison[4] studies the results of repeated measures of the Stanford Revision of the Binet-Simon Test on 468 children in the demonstration school, George Peabody College for Teachers. He found that the actual differences in IQ ranged from a minus 15 points to a plus 15 points, showing that there is quite a variation in the IQ on the Binet test. His results may be summed up as follows:

[1] Wentworth, M. M., *Individual Differences in the Intelligence of School Children*, Harvard University Press, 1928, pp. 20-48.

[2] Wheeler, L. R., *A Study of the Mental Growth of Dull Children*, Journal of Educational Psychology, May, 1930, pp. 367-378.

[3] Powell, Louise E., *Constancy of the IQ in Mental Defectives*, J. Ed. Psy., Sept., 1921.

[4] Garrison, S. C., Additional Retests by Means of the Stanford Revision of the Binet-Simon Test, J. Ed. Psy., 1922, pp. 307-312.

1. 8.5% of the group showed a difference of ten points in IQ.
2. 7% showed no variation.
3. 55% showed gains in IQ.
4. 38% showed losses.

Berry[1] studied the data obtained from retests of the Binet-Simon tests of 351 mentally retarded children in the Detroit public schools. These children had been tested at intervals for about twelve months; that is, 269 cases with an interval of 23 months, 82 cases with an interval of 35 months. This study seemed to indicate that the IQ or the mental growth of subnormal children decreased from year to year. The children who received the first test after the age of ten showed a greater decrease than those between the ages six and nine.

Jordan[2] studied the mental growth of 183 children, tested six consecutive times semi-annually during a period of three years. He used the Pintner Cunningham and Dearborn IA for grades I and II, and the National Intelligence Test for grades III to VII. He concludes that the mental growth of his subjects are well represented by a straight line curve approaching an angle of 45° in its slope. Smith[3] has given an interesting criticism of this study, showing how Jordan's unselected group is predestined to appear in such a pattern by the technique of standardization.

Jordan studied the average mental age at each chronological age and found that the average mental age equals or surpasses its respective chronological age for all ages through the tenth year. After age ten the mental ages

[1] Berry, C. S., Intelligence Quotients of Mentally Retarded Children, Sch. and Soc., 1922, pp. 723-29.

[2] Jordan, A. M., Mental Growth, J. of App. Psych., Dec. 1930, pp. 517-532.

[3] Smith, G. R., Mental Growth, A Criticism, J. of App. Psych., June 1931, pp. 319-24.

have a tendency to fall below the chronological ages until at age fourteen the average mental age has decreased to 12 years 2 months, thus showing a negative acceleration. Our previous investigation as well as the present study of mental growth curves of subnormal children show with an increase of chronological age an increasing mental retardation. This agrees with Jordan in indicating a negative acceleration in mental growth curves. Jordan explains the negative acceleration from ages nine to fourteen by the lack of intellectual appeals in the environment of the subjects. In our investigations a similar trend is shown where the subjects are taken from an urban environment which is normal in intellectual interests for all ages.

Banker[1] compiled the data of 1,000 children in typical elementary schools measured by the Stanford Revision of the Binet-Simon Test, 5,246 children of high school rank, and 4,478 college students measured by the Army Alpha test. The data for this study is crude but suggests some possibilities. Banker constructs a curve of mental growth ranging from grade I through college and four years of post graduate work. His data show an average mental age of six at grade I to a maximum of 19 in post-graduate work. Where the curve reaches its maximum it possibly indicates mental maturity beginning at the second year of post-graduate work with the mental age of 19 years. This indicates a slight negative acceleration beginning in the last two years of high school. Entrance requirements cause abrupt breaks in the curve at high school, college, and post-graduate rank due to selection. This seems to indicate that superior individuals approach a negative acceleration in mental growth later than the normal and subnormal.

In this brief review of some of the literature in the field of mental development we would like to mention

[1] Banker J. J., Mental Age Distribution in School Progress, J. Ed. R., Vol. XXIII. Apr. 1931, p. 273.

our previous study[1] of the mental growth of dull North European children from age six to eleven. A brief summary of the study follows:

1. The data consist of public school children selected entirely by the use of the Dearborn Group Intelligence tests.
2. The investigation shows no marked sex differences in mental growth.
3. The total groups show a decreasing increment of mental growth from age six to eleven.
4. The data show that the average dull child is about one year mentally retarded when he enters school, and this retardation increases from year to year until at the age of ten to eleven he has a mental retardation of over two years.
5. This study of mental growth of dull children emphasizes the importance of special classes and a differentiated curriculum for dull children.

As in the previous investigation, the data for this study were obtained from the Harvard Growth Study. Dearborn[2] began this investigation in 1922-1923 for the purpose of making repeated annual measurements on the same individuals for a period of years. The data used in this study have been collected and compiled by technically trained research workers. The intervals between the different measurements are approximately twelve months. In selecting the data for these investigations of dull children, selection is based on the results of the Dearborn Intelligence Tests Series I and II. All children were chosen who had an average IQ below 90 for the four consecutive years of measurements. For this study all races were omitted but the Italians. Then

[1] Wheeler, Lester R., A Study of the Mental Growth of Dull Children, J. of Ed. Psy., May 1930, pp. 367-378.

[2] Dearborn, W. F., The Study of Individual Abilities, The Normal Child, School and Society, VIII, Sept., 1923.

later comparisons were made with North Europeans and the two races combined.

The statistical terms used in measuring the increments of growth are the median, first and third quartiles, the semi-interquartile range, and probable error of the median as shown in Tables I, II, and III.

In obtaining the mental growth we have used the increment between the first and second test, second and third, third and fourth, etc. The results are shown in Tables IV, VI, and VIII. The retardation is indicated by the increment between the median C. A. and the median M. A. for the different age groups. (See tables IV and VIII.) The reliability of the differences in sex and race is shown in Tables V and VII, using the formula: D÷P.E. Diff.[1]

TABLE I.

*Mental Growth of Six-Year Group of Dull Italian Children for Four Consecutive Years.*

| Ages | | 6-7 | | | 7-8 | | |
|---|---|---|---|---|---|---|---|
| | | Boys | Girls | Total | Boys | Girls | Total |
| No. Cases | | 38 | 39 | 77 | 30 | 28 | 58 |
| Median C. A. | | 78 | 78 | 78 | 90 | 90 | 90 |
| Mental Months | Med. | 67.0 | 66.1 | 66.6 | 77.2 | 76.0 | 76.0 |
| | P. E. | 1.8072 | 1.8076 | .6901 | 1.2323 | .8031 | .8042 |
| | Q-3 | 72.6 | 72.2 | 72.4 | 82.5 | 80.0 | 83.0 |
| | Q-1 | 63.5 | 62.3 | 62.5 | 71.7 | 73.3 | 73.3 |
| | Q | 4.6 | 5.4 | 4.9 | 5.4 | 3.4 | 4.9 |
| Ages | | 8-9 | | | 9-10 | | |
| | | Boys | Girls | Total | Boys | Girls | Total |
| No. Cases | | 30 | 32 | 62 | 31 | 26 | 57 |
| Median C. A. | | 102 | 102 | 102 | 114 | 114 | 114 |
| Mental Months | Med. | 85.5 | 86.3 | 86.3 | 87.7 | 92.0 | 88.7 |
| | P. E. | .8763 | .9707 | .7308 | .9428 | 1.1275 | .8778 |
| | Q-3 | 89.6 | 91.3 | 90.8 | 94.0 | 96.5 | 94.8 |
| | Q-1 | 79.7 | 82.5 | 81.7 | 85.6 | 87.3 | 85.7 |
| | Q | 5.0 | 4.4 | 4.6 | 4.2 | 4.6 | 4.6 |

[1] Garrett, Statistics in Psychology and Education, Longmans, 1926, pp. 133-135.

Table I shows the mental growth of the six-year group of dull Italian children from age six to ten. The median dull child at age six to seven, or six years six months old has a mental age of 66.6 ± 0.6901 months and shows a fairly consistent increase from year to year until at the age nine to ten he is 88.7 ± 0.8778 mental months. The upper and lower 25% of the group show a similar trend in mental growth as measured by the first and third quartile. The variability as measured by the Q is fairly constant.

TABLE II.

*Mental Growth of Seven-Year Group of Dull Italian Children for Four Consecutive Years.*

| Ages | | 7-8 | | | 8-9 | | |
|---|---|---|---|---|---|---|---|
| | | Boys | Girls | Total | Boys | Girls | Total |
| No. Cases | | 36 | 48 | 84 | 34 | 41 | 75 |
| Median C. A. | | 90 | 90 | 90 | 102 | 102 | 102 |
| Mental Months | Med. | 76.5 | 74.4 | 75.5 | 84.0 | 83.8 | 84.1 |
| | P. E. | 1.0208 | .6085 | .6546 | 1.2005 | 1.0542 | .7938 |
| | Q-3 | 81.7 | 77.6 | 81.3 | 88.3 | 89.2 | 88.8 |
| | Q-1 | 72.0 | 70.0 | 71.7 | 77.2 | 78.5 | 77.9 |
| | Q | 4.9 | 3.8 | 4.8 | 5.6 | 5.4 | 5.5 |
| Ages | | 9-10 | | | 10-11 | | |
| | | Boys | Girls | Total | Boys | Girls | Total |
| No. Cases | | 34 | 39 | 73 | 23 | 31 | 54 |
| Median C. A. | | 114 | 114 | 114 | 126 | 126 | 126 |
| Mental Months | Med. | 92.0 | 88.6 | 90.1 | 93.3 | 97.5 | 95.4 |
| | P. E. | 1.0208 | .6605 | .7309 | 1.1676 | 1,1898 | .9322 |
| | Q-3 | 97.0 | 92.8 | 96.6 | 99.1 | 102.1 | 101.3 |
| | Q-1 | 87.5 | 86.2 | 86.6 | 90.4 | 91.5 | 90.6 |
| | Q | 4.8 | 3.3 | 5.0 | 4.4 | 5.3 | 5.4 |

Table II shows the mental growth of dull children from age seven to eleven. The median mental age of the group from seven to eight is 75.5 ± 0.6546 months, with a fair increase in mental age until at age ten to eleven it reaches 95.4 ± 0.9322. A similar trend is shown by the first and third quartiles. For this group the variability is slightly greater with an increase of age.

TABLE III.

*Mental Growth of the Total Group of Dull Italian Children.*

| Ages | | 6-7 | | | 7-8 | | | 8-9 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total |
| No. Cases | | 38 | 39 | 77 | 66 | 76 | 142 | 64 | 73 | 137 |
| Median C.A. | | 78 | 78 | 78 | 90 | 90 | 90 | 102 | 102 | 102 |
| Mental Mos. | Med. | 67.0 | 66.1 | 66.6 | 77.8 | 75.1 | 76.0 | 85.0 | 85.2 | 85.2 |
| | P. E. | .9328 | 1.0809 | .6950 | .9220 | .4875 | .5040 | .8437 | .7169 | .5230 |
| | Q-3 | 72.6 | 72.2 | 72.4 | 83.9 | 79.0 | 82.3 | 89.4 | 89.9 | 89.5 |
| | Q-1 | 63.5 | 62.3 | 62.5 | 71.9 | 72.2 | 72.8 | 78.7 | 80.1 | 79.7 |
| | Q | 4.6 | 5.4 | 4.9 | 6.0 | 3.4 | 4.8 | 5.4 | 4.9 | 4.9 |
| Boys' Med. | | 67.0 | | | 77.8 | | | 85.0 | | |
| Girls' Med. | | 66.1 | | | 75.1 | | | 85.2 | | |
| Diff. | | 0.9 | | | 2.7 | | | —0.2 | | |

| Ages | | 9-10 | | | 10-11 | | |
|---|---|---|---|---|---|---|---|
| | | Boys | Girls | Total | Boys | Girls | Total |
| No. Cases | | 65 | 65 | 130 | 23 | 31 | 54 |
| Median C. A. | | 114 | 114 | 114 | 126 | 126 | 126 |
| Months Mental | Med. | 88.7 | 89.9 | 89.5 | 93.3 | 97.5 | 95.4 |
| | P. E. | .8372 | .6822 | .5590 | 1.0425 | .7408 | .9180 |
| | Q-3 | 95.9 | 95.5 | 96.3 | 99.1 | 102.1 | 101.3 |
| | Q-1 | 85.1 | 86.7 | 86.1 | 90.4 | 91.5 | 90.6 |
| | Q | 5.4 | 4.4 | 5.1 | 4.4 | 5.3 | 5.4 |
| Boys' Med. | | 88.7 | | | 93.3 | | |
| Girls' Med. | | 89.9 | | | 97.5 | | |
| Diff. | | —0.2 | | | —4.2 | | |

Table III shows the mental growth of both groups combined and should be more meaningful with the increased number of cases. The median mental age of total group from six to seven is 66.6 ± 0.6950, and increases to 95.4 ± 0.9180 at age ten to eleven. Mental growth from ages six to nine increases at a fairly constant ratio with a negative acceleration between nine and ten years and a fair increase from ten to eleven years. The upper and lower 25 per cent of the group show a fairly consistent increase from six to eight and a slight negative acceleration during the latter years. The variability of the total group as measured by the semi-interquartile range shows a slight increase from 4.9 to 5.4 from ages six to eleven.

TABLE IV.

*Retardation and Annual Gain in Mental Months of Dull Italian Children for Four Consecutive Years.*

| Ages | | Six-Year Group | | Seven-Year Group | |
|---|---|---|---|---|---|
| | | Retardation | Annual Gain as measured by Med. | Retardation | Annual Gain as measured by Med. |
| 6-7 | Boys | 11.0 | --- | --- | -- |
| | Girls | 11.9 | --- | --- | -- |
| | Total | 11.4 | --- | --- | -- |
| 7-8 | Boys | 12.8 | 10.2 | 13.5 | -- |
| | Girls | 14.0 | 9.9 | 15.6 | -- |
| | Total | 13.1 | 10.3 | 14.5 | -- |
| 8-9 | Boys | 16.5 | 8.3 | 18.0 | 7.5 |
| | Girls | 15.7 | 10.3 | 18.2 | 9.4 |
| | Total | 15.7 | 11.4 | 17.9 | 8.6 |
| 9-10 | Boys | 26.3 | 2.2 | 22.0 | 8.0 |
| | Girls | 22.0 | 5.7 | 25.4 | 4.8 |
| | Total | 25.3 | 2.4 | 23.9 | 6.0 |
| 10-11 | Boys | --- | --- | 22.7 | 1.3 |
| | Girls | --- | --- | 28.5 | 8.9 |
| | Total | --- | --- | 30.6 | 5.3 |
| Average | Boys | 16.5 | 6.9 | 19.1 | 5.6 |
| | Girls | 15.9 | 8.6 | 21.9 | 7.7 |
| | Total | 16.4 | 8.03 | 21.5 | 6.6 |

| Ages | | Total Group | | | |
|---|---|---|---|---|---|
| | | Retardation | Med. | Annual Gain Q-3 | Annual Gain Q-1 |
| 6-7 | Boys | 11.0 | --- | --- | -- |
| | Girls | 11.9 | --- | --- | -- |
| | Total | 11.4 | --- | --- | -- |
| 7-8 | Boys | 12.2 | 10.8 | 11.3 | 8.4 |
| | Girls | 14.9 | 9.0 | 6.8 | 9.9 |
| | Total | 14.0 | 9.4 | 9.9 | 9.3 |
| 8-9 | Boys | 17.0 | 7.2 | 5.5 | 6.8 |
| | Girls | 16.8 | 10.1 | 10.9 | 7.9 |
| | Total | 16.8 | 9.2 | 7.2 | 6.9 |
| 9-10 | Boys | 25.3 | 3.7 | 6.5 | 6.4 |
| | Girls | 24.1 | 4.7 | 5.6 | 6.6 |
| | Total | 24.5 | 4.3 | 6.8 | 6.4 |
| 10-11 | Boys | 22.7 | 4.6 | 3.2 | 5.3 |
| | Girls | 28.5 | 7.6 | 6.6 | 4.8 |
| | Total | 30.6 | 5.9 | 5.0 | 4.5 |
| Average | Boys | 17.6 | 6.6 | 6.6 | 6.7 |
| | Girls | 19.2 | 7.9 | 7.5 | 7.3 |
| | Total | 19.5 | 7.2 | 7.2 | 6.8 |

Table IV shows the retardation and annual gain in mental months for four consecutive years. The dull children have a mental retardation of 11.4 months at the first measurement. This retardation for the six year group increases to 16.4 months difference between the mental age and the chronological age at the end of the fourth year. The average mental growth for this group is 8.03 months. The seven year group shows an average retardation of 14.5 months, and this increases to 21.5 months at age ten to eleven. Also the annual mental growth the first year of 8.6 months decreases to 5.3 months showing an average of 6.6 months mental gain. For the total group the retardation increases from 11.4 months at the first testing to 30.6 months at age ten to eleven. In other words, upon entering school the group is nearly a year mentally retarded and this retardation increases to over two and a half years at age eleven. The annual mental gain as shown by the median decreases from 9.4 mental months to 5.9 at age eleven, showing on an average 7.2 mental months gain for each year. It is interesting to note that the annal mental growth as measured by the first and third quartiles maintains a fairly definite position in relationship to the median for all ages except ages nine to ten, and ten to eleven, where the median is slightly smaller than the first and the third quartiles, showing on a general average for the first quartile, 6.8, third quartile 7.2, and median gain in mental months 7.2. The median and the upper 25 per cent show the same average mental gain which is slightly more than that of the lower 25 per cent of the total group. This seems to further emphasize the mental retardation and the fallacy of expecting normal achievement from this group.

TABLE V.

*Reliability of Sex Differences in Mental Growth of Dull Italian Children.*

| Age | Med. Diff. | P.E. Diff. | D.+P.E. Diff. | Chances in 100 |
|---|---|---|---|---|
| 6 | 0.9 | 1.4283 | .630 | 66 |
| 7 | 2.7 | 1.0247 | 2.630 | 96 |
| 8 | —0.2 | 1.1091 | .180 | 54 |
| 9 | —0.2 | 1.0770 | .185 | 54 |
| 10 | —4.2 | 1.2845 | 3.269 | 98 |
| Average | —0.2 | | | 74 |

It is interesting to note the differences in mental growth between boys and girls. Table V shows that the boys are superior to the girls for ages six to eight, and that the girls are superior for the upper ages. There is a small median difference for all ages, but from a study of the P.E.'s the differences are significant only for ages seven and ten. We might conclude that there is no significant sex difference in mental growth in dull Italian children, the increments being so small that they lose their significance for practical educational purposes. This is in accord with the majority of previous investigations of sex differences as measured by intelligence tests.

The writer realizes some of the difficulties which will naturally arise in the reader's mind in discussing racial differences as measured by intelligence tests. Most studies of racial differences in intelligence are based on nationalities rather than upon pure races as pointed out by Estabrooks.[1] We realize such a criticism may apply to the present study. Another factor affecting the scores on tests in this and previous studies is the environmental differences and the influence of language. This is shown by the fact that some Northern negroes made higher scores on the Army Alpha Test than Southern whites.[1]

[1] Estabrooks, G. H., Which Races are Best? Scientific American, May 1931, pp. 311-313.

In the study of intelligence test results on Philippine children it was found that when they were given an intelligence test written in English they were inferior to American children, but when given a non-language test there was no difference in their intelligence and that of American children.[1] The writer has found that the IQ of mountain children materially decreases with an increase of chronological age and that the language handicap becomes greater in a relative proportion to the amount of language in the intelligence tests.[2] The same general criticism might be made upon a number of studies of Indians, Negroes, and other races. In this investigation we have used the Dearborn Intelligence Test which has been standardized upon North European, Italian, Jewish, and all other races as they are found distributed in Massachusetts urban communities.

TABLE VI

*A Comparison of the Mental Growth of North European and Italian Children*

| Ages | 6-7 | | | 7-8 | | | 8-9 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total |
| No. Cases | | | | | | | | | |
| N. European | 39 | 41 | 80 | 78 | 58 | 136 | 67 | 45 | 112 |
| Italian | 38 | 39 | 77 | 66 | 76 | 142 | 64 | 73 | 137 |
| Median | | | | | | | | | |
| N. European | 67.1 | 65.7 | 66.3 | 76.9 | 78.0 | 77.5 | 86.9 | 84.5 | 86.1 |
| Italian | 67.0 | 66.1 | 66.6 | 77.8 | 75.1 | 76.0 | 85.0 | 85.2 | 85.2 |
| Diff. | 0.1 | —0.4 | —0.3 | —0.9 | 2.9 | 1.5 | 1.9 | —0.7 | 0.9 |
| Annual Gain in Mental Months | | | | | | | | | |
| N. European | | | | 9.8 | 12.3 | 11.3 | 10.0 | 6.5 | 8.6 |
| Italian | | | | 8.4 | 9.9 | 9.3 | 6.8 | 7.9 | 6.9 |
| Diff. | | | | 1.4 | 2.4 | 1.9 | 3.2 | —1.4 | 1.7 |

[1] Estabrooks, G. H., Which Races are Best? Scientific American, May 1931, pp. 311-313.

[2] Wheeler, Lester R., The Intelligence of Mountain Children, J. Ed. Psy. May 1932, pp. 351-71.

TABLE VI

*A Comparison of the Mental Growth of North European and Italian Children*

(Continued)

| Ages | 9-10 | | | 10-11 | | | Average | | |
|---|---|---|---|---|---|---|---|---|---|
| | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total |
| No. Cases | | | | | | | | | |
| N. European | 57 | 47 | 104 | 31 | 15 | 46 | | | |
| Italian | 65 | 65 | 130 | 23 | 31 | 54 | | | |
| Median | | | | | | | | | |
| N. European | 92.7 | 93.8 | 92.7 | 95.5 | 98.5 | 96.7 | | | |
| Italian | 88.7 | 89.9 | 89.5 | 93.3 | 97.5 | 95.4 | | | |
| Diff. | 4.0 | 3.9 | 3.2 | 2.2 | 1.0 | 1.3 | 1.5 | 1.3 | 1.9 |
| Annual Gain in Mental Months | | | | | | | | | |
| N. European | 5.8 | 9.3 | 6.6 | 2.8 | 4.7 | 4.0 | 7.1 | 8.2 | 7.6 |
| Italian | 6.4 | 6.6 | 6.4 | 5.3 | 4.8 | 4.5 | 6.7 | 7.3 | 6.8 |
| Diff. | —0.6 | 2.7 | 0.2 | —2.5 | —0.1 | —0.5 | 0.4 | 0.9 | 0.8 |

Table VI shows a comparison of the mental growth of dull North European and Italian children from ages six to eleven. These data indicate an average difference of 1.5 mental months for the boys, 1.3 months for girls, and a general average of 1.9 mental months in favor of the North European children.

TABLE VII

*Reliability of the Difference in Mental Growth of Dull North European and Italian Children*

| Age | Med. Diff. | P.E. Diff. | D.+P.E. Diff. | Chances in 100 |
|---|---|---|---|---|
| 6 | —0.3 | 0.9013 | 0.33 | 59 |
| 7 | 1.5 | 0.5380 | 2.78 | 97 |
| 8 | 0.9 | 0.6530 | 1.38 | 83 |
| 9 | 3.2 | 0.8200 | 3.87 | 99.5 |
| 10 | 1.3 | 1.5280 | 0.85 | 72 |
| Average | 1.3 | 0.8880 | 1.80 | 82.1 |

Table VII shows the reliability of the difference of the two races in terms of the P.E. diff. and chances in 100.

There is a fairly significant difference in favor of the North European children at the ages of seven and nine. At age six the difference is in favor of the Italian, but there are only 59 chances out of 100 that this difference is reliable. The other ages show a positive difference in favor of the North European children and a general average of 82 chances in 100 that this difference will hold true for a large number of cases. Although the data here seem to show a slight racial difference so many factors enter into the results which might influence them materially that no conclusions can be drawn as to a significant difference between the intelligence and mental development of North European and Italian children.

An increase in the number of cases should strengthen the reliability of the study of mental development. Since we have found no significant race or sex difference we are fairly safe in combining the North European and Italian boys and girls in order to study the general trend of mental growth of the children regardless of race and sex. A number of previous investigators of mental growth have assumed that the mental growth curves follow fairly well the concomitant theory of growth between the intervals of measurement. We do not know whether the dull children reach their end-point of growth before, at the same time, or after normal children. Also there is still controversy over the problem of the curve of mental growth: does it take a logarithmic or straight line form? We do not attempt to answer these problems but let the data suggest what it may.

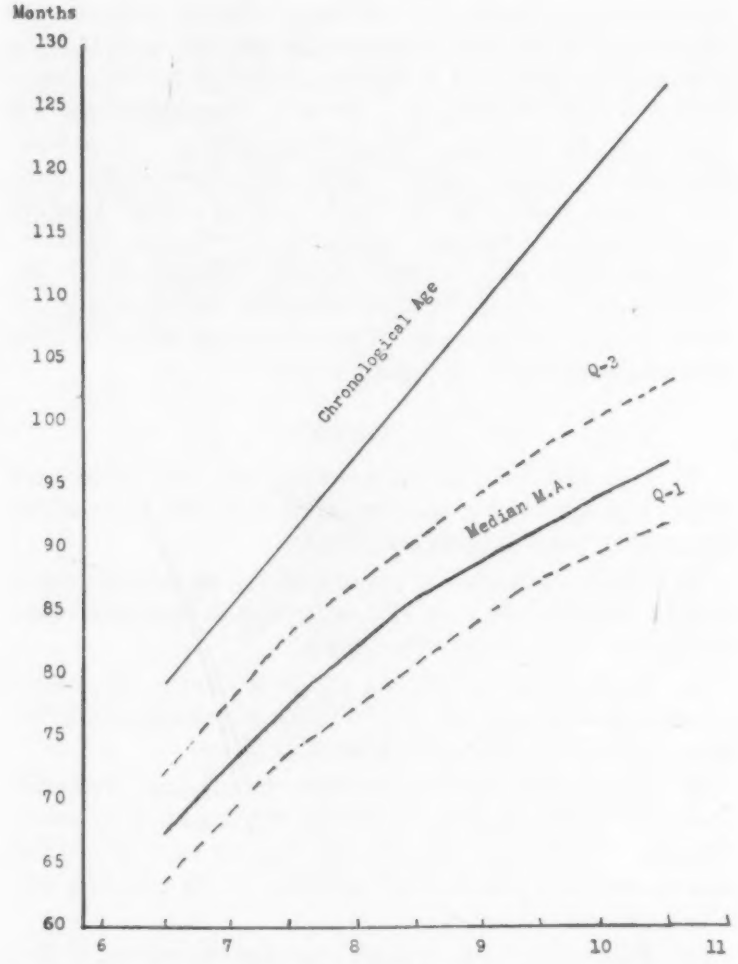
TABLE VIII

*Mental Growth of Dull North European and Italian Children Combined*

| Ages | 6-7 | 7-8 | 8-9 | 9-10 | 10-11 | Av. |
|---|---|---|---|---|---|---|
| Number Cases | 118 | 198 | 181 | 180 | 69 | |
| Median C. A. | 68 | 90 | 102 | 114 | 126 | |
| Median M. A. | 66.3 | 76.6 | 85.0 | 90.9 | 96.3 | |
| P. E. md. | .4487 | .4264 | .4645 | .4937 | .8426 | |
| Q-3 | 70.88 | 82.1 | 89.7 | 97.2 | 102.3 | |
| Q-1 | 62.3 | 72.6 | 79.8 | 86.7 | 91.2 | |
| Q | 4.05 | 4.8 | 5.0 | 5.3 | 5.6 | |
| Retardation in months | 11.7 | 13.4 | 17.0 | 13.1 | 29.7 | 16.98 |
| Annual Gain in months | | 10.3 | 8.4 | 5.9 | 5.4 | 7.5 |

Table VIII shows that the median mental age of the dull children at the first measurement was $66.3 \pm 0.4487$, and there is a gradual increase from year to year until at age ten to eleven the mental age is 96.3 months. The growth curve coincides fairly well with the concomitant theory, tending to decrease during the latter years. Our data do not show the angle at which the growth curves diverge but it is evident that they do not run parallel with the chronological age curve, as shown in Graph I. The lower and upper 25 per cent of the dull children seem to follow fairly closely the general direction of the median. We would also like to point out that with an increase in chronological age the variability of the group becomes greater as shown by the semi-interquartile range and the P.E. of the Median.

The annual gain in mental months for the first year is 10.3 and decreases to 5.4 at ages ten to eleven, indicating a negative acceleration. There is an average gain of 7.5 mental months each year. When the average dull child enters school he is about eleven months mentally retarded and this difference increases from year to year until at the age of ten to eleven he is nearly two and a half years retarded. (Table VIII.) These data coincide with our




GRAPH 1. MENTAL GROWTH CURVE OF DULL NORTH EUROPEAN AND ITALIAN CHILDREN.

previous study of mental growth,[1] and emphasize the need for a differentiated curriculum and special instruction for the dull group of children. We do not maintain that the findings in this investigation will hold true for the individual child but believe they indicate a general trend of dull children as a group. These findings indicate that as the dull child grows older chronologically his rate of mental growth seems to be less. This might imply that dull children reach mental maturity at an earlier period than the normal and superior children. This problem needs further experimentation and it can be answered only by repeated measures on the same children for the upper ages. The writer hopes to continue this study through the upper years.

## SUMMARY

1. The data for this study consist of public school children from ages six to eleven, selected on the basis of the Dearborn Group Intelligence Tests.

2. The gain in mental growth of the six year group of Italian children shows a similar trend as the seven year group for four consecutive years.

3. Both groups of Italian children show a decreasing increment of mental growth indicating a negative acceleration with an increase in chronological age.

4. This investigation shows that the average dull child is nearly a year mentally retarded when he enters school and this retardation increases from year to year until at age eleven he has a mental retardation of over two and a half years.

5. This investigation shows no significant sex difference in mental growth for ages from six to eleven.

6. The data show a fairly consistent but very small difference in mental growth between dull Italian and North European children, but the difference is not great

[1] Wheeler, L. R., *ibid.*

enough to allow us to make any definite conclusions as to racial differences.

7. The growth curves of all children disregarding race and sex seem to follow the concomitant theory and indicate a negative acceleration with an increase in chronological age.

8. These data might indicate that dull children may reach mental maturity earlier than normal and superior children.

9. The results of this study emphasize the importance of special instruction and a differential curriculum for dull children.

# COLLEGE ACHIEVEMENT, INTELLIGENCE, PERSONALITY, AND EMOTION

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Numerous studies have been made of achievement in college in relation to intelligence, and in relation to other factors.* All the studies point to the fact that grades in college are dependent at least in part upon other things than intelligence. But none of those studies has succeeded in showing what all those other factors are, so there is still room for other studies which take into consideration some of the possible other factors.

This investigation uses ratings on personality which apparently have not before been studied in relation to grades, such as pleasingness of personality and general social adjustment. The ratings of the other personality characteristics are different from those heretofore used particularly in the number of ratings secured. The measure of emotional response is a revision of the Pressey X-O test.

## THE CRITERION

The criterion of grades is the semester hour average for one semester. Where a student dropped a course during the semester the grade on that course was not used. When a subject dropped out of college before the end of the semester his average hour grade up to the

* For a comprehensive, though brief, survey of previous studies see Daniel Harris, *The Relation to College Grades of Some Factors Other Than Intelligence,* Archives of Psychology, No. 131, N. Y., 1931.

time of leaving was used. However, such exceptions were rare and did not exceed a half dozen cases.

## Tests and Ratings

The Thorndike test was used as the measure of intelligence or scholastic aptitude.

The Colgate Schedule C-2 was used as the measure of introversion-extroversion.

For a measure of emotional responses the author revised the Pressey X-O test. Parts I, III, and IV of the Pressey test were used; part II is an association test and could not be arranged for use in the revision. The words of the Pressey test were arranged in a column instead of in rows, and opposite each word were the figures from minus five through zero to plus five.

The directions for part A of the revised test were as follows:—

> Opposite each of the following words draw a circle around the number that indicates the degree of pleasant or unpleasant meaning that the word has for you. If the word has a decidedly unpleasant meaning, draw a circle around the minus 5 at the extreme left; if it has a decidedly pleasant meaning, draw a circle around the 5 at the extreme right; if it is neither pleasant nor unpleasant in meaning to you, draw a circle around the 0. If it is only relatively pleasant or unpleasant, draw a circle around the number which most adequately represents the relative degree of pleasantness or unpleasantness. The minus sign signifies the unpleasant side of the scale; no sign represents the pleasant side of the scale.
>
> *Do not study over your responses; immediate judgments are desired. Encircle only ONE number for each word, but be sure to indicate your response to EVERY word.*

Similar directions were given for part B and for part C, except that in part B the words represented something praiseworthy or blameworthy, and in part C they represented things worrisome, fearful or dreadful on the one hand or joyful on the other.

Four different scores were calculated on this test and used in this study:—

1. Intensity of emotional response—the sum of all the figures encircled regardless of sign. The reliability co-efficient of this score is .74.

2. Variability of intensity—the sigma of the distribution of intensities regardless of sign. The reliability co-efficient of this score is .70.

3. Deviation—First the average rating for each word by the entire group was determined. Since the group ratings showed different variability on the various words, the PE of the group average for each word was figured, and the deviation based upon the average and the PE. Ratings of any subject within one PE of the average of the group were not considered deviations; but scores of deviation were given for each PE of deviation, approximately, on either side of the average. The deviation score then represents the total PE deviation regardless of the direction of the deviation. The reliability co-efficient is .69.

4. Emotional consistency—This score was obtained by repeating the test and counting up the total amount of change that the subject made in his ratings. The reliability co-efficient of this score is not known.

Ratings were secured on pleasingness of personality, emotional steadiness, emotional expressiveness, and social adjustment. In each case the measure of the personality characteristic was the judgment of the fellow students (both men and women) of the subject.

The names of all the students taking the course in elementary psychology—a total of about two hundred—were mimeographed, and opposite each name were the numbers ranging from one to ten. Such a list accompanied each of the four sheets of directions.

For judgments on pleasingness the directions were as follows:—

> Rate the following individuals on how they affect you. Do not consider their general reputations. Try to answer the question: "Is my response to this individual pleasant or unpleasant?" If

your response is very pleasant, draw a circle around the figure ten (10); if your response is unpleasant in the extreme, put a circle around the one (1). In order to gauge the pleasantness of your response, consider the response that you make to the individual you like best as the standard for circling the ten (10). In gauging the unpleasantness of your response, consider the response you make to the individual you dislike the most as the standard for encircling the one (1). Rate the rest with relation to these two extremes.

DO NOT RATE ANY INDIVIDUAL WHOM YOU FEEL YOU DO NOT KNOW WELL ENOUGH TO RATE.

For ratings on emotional steadiness the instructions were:—

Rate the following individuals on the steadiness or evenness of their emotional responses. Try to answer the question: "Is he erratic or uncertain; is it impossible to tell how he will respond emotionally to any situation?" Consider only actual evidence of his behavior. Consider the most erratic and unsteady individual you know as rating (10); and the steadiest individual you know as rating (1). Rate all the others with these two as standards for extremes.

DO NOT RATE ANY INDIVIDUAL WHOM YOU FEEL THAT YOU DO NOT KNOW WELL ENOUGH TO RATE.

For emotional expressiveness the instructions were:

Rate the following individuals on the basis of their emotional expressiveness. If you consider the individual to be emotionally expressive to a high degree, draw a circle around the ten (10). If you consider the individual to be phlegmatic or emotionally unexpressive to a high degree, draw a circle around the one (1). Take into consideration only actual evidence that you have of the expressiveness or lack of expressiveness; do not consider what you think him capable of. Also do not consider his "acting" ability. As a guide to your estimates, take the most emotionally expressive individual that you know as representing ten (10) and the most inexpressive individual as represented by one (1). Rate the rest accordingly.

DO NOT RATE ANY INDIVIDUAL WHOM YOU FEEL THAT YOU DO NOT KNOW WELL ENOUGH TO RATE.

And with adjustment the directions were as follows:

Rate the following individuals on the basis of whether you consider them well adjusted or poorly adjusted to the usual situations of life. "Well adjusted" means that he "fits in well" into the various situations of life; in social situations as well as in the

academic environment; with old people as well as with people of his own age; with individuals of the opposite sex as well as his own sex; with people of importance as well as those of not much importance; and so on. "Poorly adjusted" means that he does not "fit in well;" that he is queer; that he appears to be uncomfortable in all or some of these situations. Base your judgments on actual evidence only; do NOT estimate what you think the individual might do. Rate the most adequately adjusted individual as ten (10); and the most poorly adjusted individual as one (1). Place the others along the scale in the positions where you think they belong.

DO NOT RATE ANY INDIVIDUAL WHOM YOU FEEL THAT YOU DO NOT KNOW WELL ENOUGH TO RATE.

The average rating was taken as the measure of the specific characteristic; but in no case was a subject used who did not have at least five ratings. The average number of estimates given on pleasingness of personality was fifty-one and three-tenths (51.3); the range was from seven to one hundred and thirty-four (7-134); and the sigma was twenty-four and nine-tenths (24.9). With steadiness of emotional response the average number of ratings for each subject was thirty-four and nine-tenths (34.9); the range was from five to one hundred and two (5-102); and the sigma was eighteen and four-tenths (18.4). The average number of ratings on expressiveness was thirty-four and one-tenth (34.1); the range was from three to one hundred and two (3-102); and the sigma was eighteen and three-tenths. While on the estimates of adjustment the average number of ratings was thirty-seven (37.0); the range was from five to one hundred and seven (5-107); and the sigma was twenty and four-tenths (20.4).

## The Subjects

The subjects used were eighty-nine college men, mostly of sophomore rank with a sprinkling of juniors and seniors. There were no freshmen. The subjects had an opportunity to know each other for over a year. Since they were going to a small college of about twelve hun-

dred students in a small town with about twenty-five hundred inhabitants, the opportunities to know their fellow students from contacts in many social and academic situations were relatively great.

## RESULTS

The correlations between grades and the various measures and ratings are indicated in Table I.

### TABLE I.

*Showing the Correlations Between Grades and the Measures and Ratings Indicated*

| | |
|---|---|
| Thorndike | .37 |
| Introversion-extroversion | .26 |
| Emotional intensity | —.12 |
| Emotional variability | —.10 |
| Emotional deviation | —.16 |
| Emotional reliability | —.29 |
| Pleasingness | .10 |
| Steadiness | —.30* |
| Expressiveness | .11 |
| Adjustment | .02 |

* It should be remembered that a high score on steadiness means that the individual is considered emotionally unsteady, so that the negative correlation means that steadiness is positively associated with high grades.

The significant correlations appear to be between grades and Thorndike, emotional steadiness, emotional reliability or consistency, and introversion.

When we add emotional steadiness to the Thorndike score the multiple correlation becomes .47. When emotional consistency is added to the Thorndike score the multiple becomes .41. And when we add the measure of introversion to Thorndike the multiple becomes .42.

In each case the simple correlation between grades and Thorndike is raised by the addition of the other factors.

Now, if we make a composite score by reducing all the scores to step scores based on a distribution of from fifteen to twenty steps, but reversing the distributions of steadiness and emotional consistency since the correlations between grades and these measures are negative, and then adding the step scores on Thorndike, introversion, steadiness and consistency, we get a correlation between grades and the composite score of .67.

In securing this correlation only forty-four cases were used since the records for the other subjects among the eighty-nine with whom we originally started were lacking in one measure or another.

## CONCLUSION

We are, from this study, warranted in concluding that from a knowledge of the Thorndike score of a student in college, with his score on the Colgate schedule C 2, with a satisfactory estimate of his emotional steadiness, and a record of his emotional reliability or consistency as measured by the Flemming revision of the Pressey X-O test, we would be able to predict with some assurance the academic achievement of a college man in terms of grades.

# MENTAL FATIGUE OF MEXICAN SCHOOL CHILDREN

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In previous studies of racial work curves, Whites, Negroes, (1) mixed blood Indians, and full blood Indians of nomadic and sedentary tribes were used as subjects (2, 3). In all these studies the same experimental materials and method were used (4). The present study is an effort to add to the racial groups one more group, that of Mexican children living in San Antonio, Texas.*

*Problem*—The problem is to set a situation of continuous performance during a period of work and to sample the efficiency of the workers at periods of two minutes each in order to see what fluctuations occur in the work curve and particularly to ascertain if there is a falling off in performance at the end of the period. It is desirable also to bring the results into comparison with a similar performance of white children.

*Materials*—Tablets of one column addition with nine addends—the Thorndike Addition Sheets—all columns being of about equal difficulty were constructed. There were fourteen sheets for the younger group (3rd and 4th Grades) and twenty-one sheets for the older group (7th and 8th Grades).

*Administration*—The students were motivated by our saying that it was desired to find out who was the "best

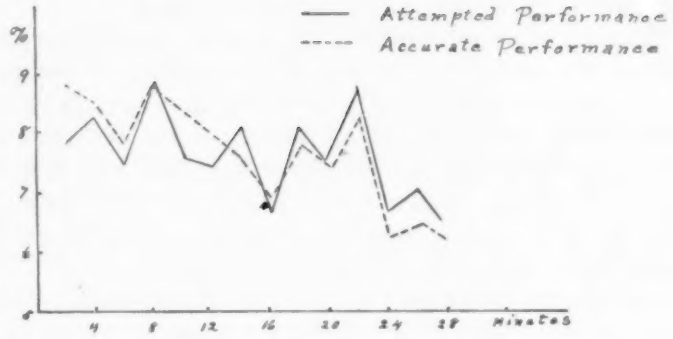
* Acknowledgment is herewith made of the courtesy of the administrative officials of the public schools of San Antonio for permission to give the tests.

adder in the class." Before the test proper began the subjects were instructed to write on the blank space on the back of the tablet the name, school grade, age, sex and date. Since all the subjects were Mexican children it was not necessary to have them designate anything regarding race. There were 45 in the 3rd grade and 52 in the 4th grade: 51 in the 7th grade and 47 in the 8th grade.

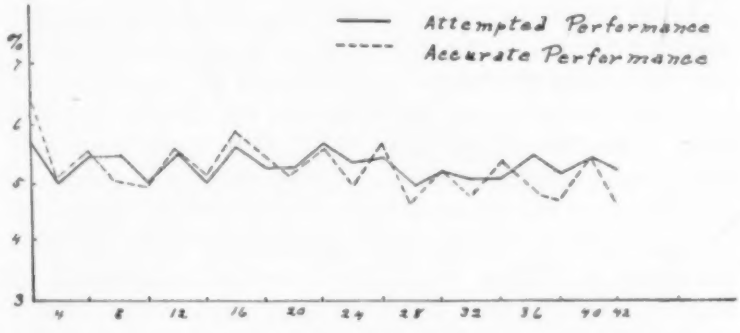
*Handling the Data*—The sheets were scored with reference to number attempted and number accurate for each period of two minutes and for the total working time—twenty-eight and forty-two minutes respectively. The next step was to ascertain what per cent of the subject's total work was done at any one period. In this way an individual work curve for each child was had which would be comparable with every other child's work curve. These individual work curves were made into group work curves (one for the younger group—3rd and 4th grades—and one for the older group—7th and 8th grades). There were 97 in the younger group and 98 in the older group. The data were handled with reference to the two categories—attempted performance and accurate performance. We present herewith two curves, attempted and accurate performance curves for the younger group, and the same for the older group. See Figures 1 and 2.

It is a matter of interest to know what per cent of a performance is done at the first and what is done by the middle of the performance and lastly what is done at the end. We present these data in Table I. Also in this table we present comparisons with the performance of white children with reference to various parts of the curve and in order to note if there are indicated racial differences in the work curves.

*The Curves*—If one will note the curves, he will see that in attempts the younger group holds its own fairly well, with some fluctuation until the twenty-fourth min-




$3^{rd}$ and $4^{th}$ Grades




$7^{th}$ and $8^{th}$ Grades

FIGURES 1 AND 2.

ute of work; in accurate performance the tendency of the curve is fairly downward with performance after the twenty-second minute of work fairly low: he will see also that in attempts for the older group, the curve is almost on a dead level but that in accurates there is a suggestion of fatigue but it is not alarming.

*Tapping the Curves*—For the younger group we have tapped the curve for the first six minutes, for the first seven minutes, and for the last six minutes. For the older group we have tapped the curve for the first six minutes, for the first twenty-two minutes, and for the last six minutes. Table I will give the average and the S.D. for these points since supporting each point on the curve there is a distribution on a scale.

*Interpretation*—It will be seen upon examining Table I, showing various points at which the work curves have been tapped, that the younger subjects lose 15 per cent in attempts and 25.8 per cent in accurates and that they are disposed to do slightly more than half of their work by the time half of the period is finished, but the situation is worse for accurates than for attempts. As to the older students there is little difference between the beginning and ending of attempted performance, a loss of 1.9 per cent, but for accurate performance the loss is 15.4 per cent. They are disposed to do slightly more than half of the work in both attempts and accurates, but the situation is worse for accurates than for attempts, again.

Upon comparing the Mexican results with the performance of Whites, we find in terms of overlapping of Mexican performance upon White medians (see Table I again) that in the case of the younger Mexicans the difference tends to be greater for attempts than for accurates. They are more like Whites in their accurate performance than they are in attempted performance. But the same is not consistently true for the older Mexican students. Note the overlapping of 20 per cent for attempts and 35 per cent for the accurates in the case of

## TABLE I

Third and Fourth Grades

| | 1st 3 Periods | | 1st 7 Periods | | Last 3 Periods | | % loss |
|---|---|---|---|---|---|---|---|
| Mex. | | | | | | | |
| % Att. | Ave. | S.D | Ave. | S.D. | Ave. | S.D | |
| | 22.54 | 3.06 | 52.11 | 4.33 | 19.14 | 3.08 | 15.1 |
| White | Med. 21.81 | | Med. 50.28 | | Med. 21.59 | | |
| Mex. | | | | | | | |
| % Acc. | Ave. | S.D | Ave. | S.D. | Ave. | S.D | |
| | 24.11 | 6.4 | 54.87 | 3.7 | 17.79 | 6.1 | 25.8 |
| White | Med. 22.41 | | Med. 51.52 | | Med. 19.82 | | |

Seventh and Eighth Grades

| | 1st 3 Periods | | 1st 11 Periods | | Last 3 Periods | | % loss |
|---|---|---|---|---|---|---|---|
| Mex. | | | | | | | |
| % Att. | Ave. | S.D | Ave. | S.D. | Ave. | S.D | |
| | 15.06 | 2.7 | 52.93 | 3.3 | 14.77 | 2.14 | 1.9 |
| White | Med. 14.9 | | Med. 53.02 | | Med. 14.9 | | |
| Mex. | | | | | | | |
| % Acc. | Ave. | S.D | Ave. | S.D. | Ave. | S.D | |
| | 16.32 | 3.59 | 54.52 | 6.67 | 13.80 | 2.95 | 15.4 |
| White | Med. 15.1 | | Med. 54.7 | | Med. 14.9 | | |
| | *Mexican Overlap on White Median* | | | | | | |

Third and Fourth Grades

| | First 3 Periods | First 7 Periods | Last 3 Periods |
|---|---|---|---|
| % Att. | 65% | 72% | 20% |
| % Acc. | 62% | 65% | 35% |

Seventh and Eighth Grades

| | First 3 Periods | First 11 Periods | Last 3 Periods |
|---|---|---|---|
| % Att. | 52% | 47% | 40% |
| % Acc. | 65% | 43% | 47% |

the younger students; and 40 per cent for attempts and 47 per cent for accurates in the case of the older students when we compare the work of the last 3 periods. While an overlap of 35 per cent and less indicates a tendency toward a difference, an overlap of 40 per cent and 47 per cent can hardly be said to be convincing. Perhaps selection has operated to make the young Mexicans more different from Whites and to make the older Mexicans more similar to the Whites. The case is not conclusive. The element of training also comes in. Perhaps the younger students are the victims of poor nutrition. It is not known just what factors influence the work curves of children. But we are not willing to say that race is the determining factor as the situation is revealed in the present study.

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# NOTE ON THE VALIDITY AND RELIABILITY OF THE TOTAL SCORES YIELDED BY THE PRESSEY X-O TEST OF THE EMOTIONS

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This note presents data concerning the validity and the reliability of the total affectivity and total idiosyncrasy scores yielded by the Pressey X-O Test for Investigating the Emotions, Form A. Freeman comments that this test represents the most ambitious attempt which has been made to work out an instrument for the measurement of the emotions.[1]

His brief description of the test follows:

"Pressey's scale makes use pretty largely of experience of abnormal mental attitudes, and emphasizes the pathological emotional conditions. The four tests may be described as follows. The first test aims to discover various special types of unpleasant feeling. In the second test we find an adapted form of the free association test, which again seeks to uncover pathological and criminological attitudes. The third test is an ethical discrimination test, and the fourth test is aimed to discover certain anxiety tendencies. . . .

". . . The test is scored in terms of the total number of words which are crossed out, which is an indication of one's general emotionality, and the deviation in the words which are marked as being most unpleasant from those which are most unpleasant (and so on) from those which are most frequently marked by people in general. . . .

". . . The scores on all the four tests are added, and this score is taken to indicate total emotionality. The deviations are then added and the total is taken to express idiosyncrasy in emo-

[1] F. N. Freeman, *Mental Tests.* Boston: Houghton, Mifflin Company, 1926. Page 207.

tion. The author does not, however, emphasize merely these total scores, but emphasizes the desirability of making an analysis of the subject's responses."[2]

Three hundred three students in the San Diego State Teachers College served as subjects for the study. Not all of the data were available for all of the subjects. The data were collected during the school years of 1926-1927 and 1927-1928. The measures considered here include the total affectivity scores yielded by the Pressey test (hereafter designated as TAfS), the total idiosyncrasy scores yielded by the Pressey test (TIdS), self ratings by the subjects on their total emotional affectivity (TAfR), self ratings by the subjects on their total emotional idiosyncrasy (TIdR), and average ratings for certain subjects given by other experimental subjects on total emotional affectivity (ATAfR), and on total emotional idiosyncrasy (ATIdR). In statistical summaries in this study, the numerals (1) and (2) following any measure symbol indicates the first or second administration of the test or the first or second rating which was given.

One hundred fifty subjects gave self ratings, using a scale ranging between 1 and 11 points, with 1 as low and 11 as high emotional value and 6 as average value. The range from 5 to 7 included the middle one-third of the cases. Since at least four judgments were required in estimating an average judgment of a given subject and since persons were asked to rate only those subjects in the group with whom they had had extensive social and classroom contacts, only thirty average ratings were available. Sixty-six of the subjects repeated their self ratings after an interval of six weeks, without having had warning that this would be required. The time intervals between test and re-test administrations varied from two to fourteen months with different subjects.

The ten series of measures are summarized in Table I.

[2] F. N. Freeman, *ibid*, pages 207, 208, 209.

TABLE I

*A Summary of the Ten Series of Measures.*

| Measure | N | Range | | M | P.E.M | S.D. | V |
|---|---|---|---|---|---|---|---|
| | | From | To | | | | |
| TAfS-1 | 303 | 19 | 395 | 182.29 | 2.10 | 54.02 | 29.63 |
| TAfS-2 | 200 | 51 | 383 | 182.24 | 2.74 | 57.45 | 31.52 |
| TIdS-1 | 303 | 15 | 80 | 48.78 | 0.34 | 8.83 | 18.10 |
| TIdS-2 | 200 | 10 | 72 | 44.09 | 0.48 | 10.09 | 22.88 |
| TAfR-1 | 150 | 3 | 11 | 7.08 | 0.10 | 1.78 | 25.13 |
| TAfR-2 | 66 | 2 | 11 | 6.83 | 0.17 | 2.06 | 30.25 |
| TIdR-1 | 150 | 1 | 10 | 6.10 | 0.09 | 1.56 | 25.57 |
| TIdR-2 | 66 | 3 | 9 | 6.53 | 0.13 | 1.52 | 23.41 |
| ATAfR | 30 | 3 | 11 | 6.83 | 0.28 | 2.31 | 33.82 |
| ATIdR | 30 | 4 | 10 | 6.73 | 0.18 | 1.48 | 21.99 |

The relationships existing between the ten series of measures, when paired, are given in Table 2.

Neither the total emotional affectivity scores nor the total emotional idiosyncrasy scores are highly reliable. The self ratings for total emotional affectivity and for total emotional idiosyncrasy are equally unreliable. Few of the validity coefficients indicate even a marked degree of relationship, indicating that the several series of scores, of self ratings, and of ratings by others do not measure the same thing or things in the same amount. The subjects, in other words, do not recognize in themselves or in others the elements measured by the test. Apparently, then, the usefulness of the test lies in the analysis which it yields, since the total scores yield results of little significance.

TABLE II

*Intercorrelations Involving the Ten Series of Measures*

| Measure | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | ATIdR |
|---|---|---|---|---|---|---|---|---|---|
| (1) TAfS-1 | .596 | .008 | .454 | .205 | .510 | .129 | .026 | .344 | .203 |
| | ±.030 | ±.038 | ±.050 | ±.052 | ±.061 | ±.054 | ±.082 | ±.108 | ±.118 |
| | (200) | (303) | (114) | (150) | (66) | (150) | (66) | (30) | (30) |
| (2) TAfS-2 | | .027 | .147 | .210 | .358 | .136 | .199 | .238 | .031 |
| | | ±.063 | ±.061 | ±.061 | ±.088 | ±.063 | ±.097 | ±.116 | ±.122 |
| | | (114) | (114) | (109) | (44) | (109) | (44) | (30) | (30) |
| (3) TIdS-1 | | | .280 | .104 | .232 | .184 | .285 | .243 | —.100 |
| | | | ±.043 | ±.054 | ±.078 | ±.053 | ±.076 | ±.115 | ±.121 |
| | | | (200) | (150) | (66) | (150) | (66) | (30) | (30) |
| (4) TIdS-2 | | | | .114 | .098 | .177 | .071 | —.068 | —.115 |
| | | | | ±.063 | ±.100 | ±.062 | ±.101 | ±.122 | ±.121 |
| | | | | (109) | (44) | (109) | (44) | (30) | (30) |
| (5) TAfR-1 | | | | | .675 | .340 | .318 | .681 | .442 |
| | | | | | ±.045 | ±.048 | ±.075 | ±.066 | ±.099 |
| | | | | | (64) | (150) | (64) | (30) | (30) |
| (6) TAfR-2 | | | | | | .304 | .306 | .556 | .384 |
| | | | | | | ±.076 | ±.075 | ±.140 | ±.173 |
| | | | | | | (64) | (66) | (11) | (11) |
| (7) TIdR-1 | | | | | | | .216 | .399 | .382 |
| | | | | | | | ±.080 | ±.103 | ±.105 |
| | | | | | | | (64) | (30) | (30) |
| (8) TIdR-2 | | | | | | | | .274 | .483 |
| | | | | | | | | ±.188 | ±.156 |
| | | | | | | | | (11) | (11) |
| (9) ATAfR | | | | | | | | | .581 |
| | | | | | | | | | ±.081 |
| | | | | | | | | | (30) |

# THE CONDITIONING ROLE OF EXPERIENCE IN STUDENT JUDGMENT OF OPTIMUM SIZE OF COLLEGE CLASSES

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Ordinary observation shows that judgments are relative, varying in part with the experience of the persons making them. This fact raises the question whether student judgment and attitude regarding college class size and its effect upon learning do not likewise fluctuate between different institutions or even between different departments in the same institution. The following investigation was made with a view to determining, first, just how different would be the student reaction to class size in an institution where smaller classes are a practicable ideal from the same reaction in a large state university and, second, whether previous experience plays a part in any differences discovered.

Questions similar to those used in the University of Minnesota study and reported in "Class Size at the College Level" were formulated and placed late in the month of May, 1931, before 56 Dartmouth College juniors and seniors who were enrolled in five classes in the Department of Education. The major fields of these students were distributed in fifteen different departments of instruction as diverse in character as Chemistry and Music. Of the group 27 were juniors and 29 seniors, all of these students having had experience both in small and large classes. Although the number of students involved is small it appears to be a fairly representative sampling of upperclassmen at Dartmouth. The total enrollment

of the several divisions of the institution is maintained at approximately 2,200 students.

The first comparison deals with the size of the class preferred. A fraction over 73 per cent of the Dartmouth students favor small classes, while 23 per cent prefer to attend those of medium size. Seniors are decidedly more partial to the small class than are the juniors, while with the latter the medium size class is half as popular as the small. It will be recalled that in the Minnesota study only 33 per cent of the senior college and graduate students preferred to attend small classes, with 39 per cent favoring the medium, 17 per cent the large, while with 11 per cent size was immaterial.

The differences between the students of the two institutions are further thrown into relief when the respective definitions of small and large are contrasted. At Dartmouth the median numbers of students considered as marking the upper limit of small classes were as follows: for lecture, 36; for a recitation or discussion, 18; and for laboratory, 22. At Minnesota similar replies gave these figures respectively: 50; 25 and 25.

On the other hand a question regarding the number constituting the lower limit of a large class brought from students of the first institution the following answers which are reported in terms of medians: for lecture, 54; recitation and discussion, 25; laboratory, 30. The corresponding figures for Minnesota were: 75; 30 and 30. Differences of the same magnitude are encountered when the two groups of students state the number in the class of ideal size. The medians of the answers at Dartmouth are: 44 for lecture; 16 for recitation-discussion; and 21 for laboratory, while at Minnesota they are: 75, 20 and 20 respectively. The reader will observe that the divergence in the two sets of answers is greatest when lecture sections are involved and smallest when dealing with laboratories.

With the preference for small classes so pronounced, there press to the fore questions as to the reasons. In the first place whether it is desirable or not many students judge the merits of a class in part by the mark obtained in it and are influenced in their preferences by satisfactory or unsatisfactory experiences with marks. Now 67 per cent of the Dartmouth students reported that small classes yielded the most satisfactory marks to the student, and 83 per cent thought that the least satisfactory marks were obtained in large classes. Regardless of its truth, with students holding this belief their partiality for small classes is more understandable.

Again as at Minnesota but with even greater emphasis at Dartmouth it is felt that a student in a large class is handicapped by lack of personal contact with the instructor, this being the view of 82.8 per cent of the group questioned. Such unanimity might be expected from students whose watchword seems to be "personal contact." Minnesota upperclassmen were not so agreed. Since this contact might come through the meeting of minds in the classroom discussion or recitation, the question was raised whether the value of a course was in direct proportion to the number of times a student recited or participated in discussion. Strange to say only 32 per cent answered in the affirmative, the remainder replying in the negative. Another opportunity for such personal contact would be in conferences with instructors regarding the work of the course. Whereas Dartmouth students reported a median number of 1.5 conferences per semester with each large class instructor, they had 4.6 conferences with each small class instructor. In the matter of conferences then it seems that small classes serve somewhat better to bridge the gap between student and instructor, although large class instructors are by no means inactive in this respect.

Further, it seems probable that aside from such reasons as these for being favorable to small classes much

of the student attitude is to be explained on the basis of the well-known tendencies to be satisfied with practices sanctioned by custom or to judge the merits of the new in terms of past experience. In other words, present and previous experience may influence their judgment of the relationship between class size and optimum conditions for learning. Some evidence supporting this view appears in the testimony already presented.

Why should Dartmouth and Minnesota students have such diverse opinions as to the numbers constituting small and large lecture classes as seen in the figures given above? May not one explanation be found in the fact that the lecture sections at one institution are usually larger than at the other? Thus different relative standards would be used in judging smallness and largeness. On the other hand, in laboratory work where size of section does not fluctuate so greatly from institution to institution if the total enrollments are adequate, the two groups see smallness and largeness nearly eye to eye.

Moreover, would not the influence of these factors go far toward explaining the fact that 73 per cent of the upperclassmen at Dartmouth prefer small classes whereas only 33 per cent of the senior college and graduate students at Minnesota did so? For the former had had a median experience of 10.4 small classes in college and only 5.8 large ones, while the latter's small class experience was 8.4 and large class experience over 11.

Since there is the possibility that the Dartmouth preferences might be accounted for in part through students being relatively less mature or having come from small secondary schools, inquiry was made. If age be used as a measure of maturity there is little to distinguish these students from those in other colleges. The entering classes from which these juniors and seniors were drawn averaged respectively 18.1 and 17.9 years, while the actual subjects themselves averaged 18.2 and 18.0 respectively. The distance of a student's home from col-

lege is sometimes loosely regarded as having an inverse relationship with his maturity. Of the juniors and seniors studied, 14.8 per cent and 24.1 per cent respectively had homes in New Hampshire; 40.7 and 24.1 per cent respectively lived outside of New England altogether, while the remainder lived in other New England states.

Likewise, the majority of the subjects of this investigation are not graduates of extremely small secondary schools, since the median size of the graduating classes from which the juniors came was 66.7 pupils and that of the seniors 88.9 pupils. Thus most of them would have had secondary school classes of some size. It would appear, therefore, that an explanation must be sought among factors operative in college itself.

While emphasizing the role of present and previous experience in conditioning student reaction to class size, other factors entering into a complete account must not be overlooked as the following illustration shows. The Dartmouth students were divided into three groups according to their class experience. There were 31 who reported having had more small classes than large; 16 with approximately equal numbers of each; and 9 with more large than small classes. It is true that among the first group 77 per cent preferred small classes; 75 per cent of those equally experienced with either preferred small classes; and only 55 per cent of those with more large class experience held this preference. Yet the two students expressing a preference for large classes were found in the first and second groups respectively, not in the third.

To sum up the matter, experience is manifestly one element in determining whether a class of a given size is satisfactory to students. It follows that in as far as this element is involved, they could be habituated to larger lecture classes without doing violence to fundamental learning attitudes (although the transition stage

might prove irritating) if a higher student-instructor ratio should be necessitated by financial considerations. It seems equally certain that some educational values, even though they be as yet intangible, are obtained through small group contacts and it would be a mistake to cease supplementing large class instruction with such contacts or to allow the small class to disappear.

# EXAMINATION OF MISS GENE DENNIS, "PSYCHIC"

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The following is an excerpt from the *St. Louis Times* of May 28, 1932: " 'The murderer of Sam Dardick has never gone far from the scene of the crime—and is in St. Louis today.' (Dardick was found slain . . . two months ago.)

"The author of this statement never saw Sam Dardick, never saw his slayer, but she is none the less positive about her 'vision version' of the case that remains a baffling mystery.

"It was Gene Dennis talking. Miss Dennis is not a fortune-teller. She does not read the future in dregs left in a cup. She is not a crystal-gazer. Miss Dennis, appearing in person this week on the Ambassador theater stage, is *a real seer.*" (Italics ours).

Just before each performance of Miss Dennis at this St. Louis theater, the movie-tone announcement stated that she has been examined by departments of Psychology in the large universities all over the country and that psychologists have been amazed at her performance. On the first day of her week's appearance in St. Louis, Miss Dennis asked to be examined by the Psychology Department of Washington University, and was accordingly given three tests by the writer of this paper. Miss Dennis was so "amazed" in the examination that the tech-

nique of testing and the results obtained should be of interest.

On the first test, the Otis Self-Administering Test of Mental Ability (Higher Examination: Form C), she was allowed 20 minutes. She is 23 years old, and her score was 38. This indicates that she is slightly below average.

The second test given her was the Peterson Rational Learning Problem, in which the letters A to J inclusive are numbered in random order from 1 to 10. Miss Dennis's problem was to name the correct number for each letter, the series of letters being given orally in a different order each time. Previous laboratory experiments had indicated that the average college student requires about 20 minutes and about 10 trials for mastery. After 28 minutes and 9 trials, Miss Dennis was stopped, in order to allow ample time for the third test. She had made very little progress toward solution of the learning problem.

For the third test, the following written instructions were handed to Miss Dennis:

"There are 42 envelopes in this bundle. In each of 21 of the envelopes is a written question together with the correct answer to that question. In each of the remaining 21 envelopes is a blank piece of paper. Each envelope containing a question is sealed and has been clipped to another envelope containing a blank; and, for identification, the two envelopes have been marked with a corresponding number.

"The third person here in the room will select at random any two envelopes clipped together. The sealed envelope, containing the question and answer, he will hand to me; and the unsealed envelope, containing the blank, he will hand to you. I will open my envelope and will think about the question and answer contained therein. You will write on the blank in your envelope the question and the answer to the question which I am thinking about. When you have done this, we will both hand our papers to the third person, and he will put them together in one envelope.

"He will then repeat the same procedure with two more envelopes until all 21 questions have been answered. It is understood that during this entire experiment you and I will sit on opposite sides of the table, with a screen between us. The third person

will sit at the end of the table where he can see both of us, but neither of us will be able to see the other. It is also understood that we three will be the only ones in the room at any time.

"For your information, none of the questions in the envelopes are at the present time known either to me or to the third person, but have been written and sealed by an outsider.

"After the experiment begins, there will be no conversation."

Miss Dennis stated that she understood the instructions, and the experiment was begun. However, after five of the twenty-one questions had been attempted, Miss Dennis suddenly remembered an appointment, which unfortunately prevented the answering of the other sixteen. The five questions and answers, together with what Miss Dennis wrote out as the five questions and answers, are presented below:

1. Q. Is free copper ever found in bird feathers? A. Yes.
   Miss D.: Who invented electric lights. Edison —I see a pond of water in distance—Very blue—
2. Q. What is the after-image of red? A. Green.
   Miss D.: In what year—author—writing—play —Something about music—I can see fields of flowers—and big sickles mowing or cutting them.
3. Q. In what field is Henry Fairchild Osborn noted? A. Anthropology.
   Miss D.: In what City—Building—Book—Friday.
4. Q. What is the best measure of central tendency when the distribution is skewed? A. Median.
   Miss D.: Is this an unlucky number no—(I see a church and steeple tower sky—
5. Q. Where is Pomona College? A. Claremont, California.
   Miss D.: What work are you most interested—Science—(I see many numbers—)

## Conclusions

The experiment seems to justify the following conclusions with regard to Miss Dennis:

1. In terms of IQ, she was slightly below average.
2. In the solution of a learning problem, she was considerably less efficient than the *average* college student.
3. As to "mind-reading" ability, she failed to demonstrate any.
4. In no part of the experiment was there evidence of "psychic" powers.

## NEWS AND NOTES

The attention of our readers is called to the article in the October issue of this Journal by Dr. Harriet Babcock, the title being "The Short Army Performance Scale in Clinical Practice." It is the belief of the author and others that Miss Babcock's article will prove very useful to members of the staffs of psychological clinics. Inquiry concerning reprints may be addressed either to the author, 25 Prospect Place, New York City, or to this Journal.

The annual meeting of the Ohio Academy of Science for 1933 will be held at Ohio University, Athens, Ohio, April 14-15. The West Virginia Academy has been invited to attend the sessions also and it is the hope of the committee in charge that the joint meetings will be as profitable as those held by the Ohio, Indiana and Kentucky Academies at Miami University in 1930. Professor L. D. Hartson, Oberlin College, is one of the Vice-Presidents and will have charge of the preparation of the program of the Psychology Section.

At a recent meeting of the Executive Committee of the Ohio Academy of Science it was decided that the Academy might render a useful public service by sponsoring a series of weekly radio talks on popular scientific subjects of current or general interest. These talks will be given each Friday evening between 8 and 9 o'clock, over Station WEAO, beginning early in January. More complete announcement will be made of these radio talks a little later. The various fields represented by the Academy, including Psychology, will provide for addresses of interest to workers in these sciences.

Some of the world's most prominent men of science will gather in Chicago next June in connection with the summer session of the American Association for the Advancement of Science, The World's Fair and in connection therewith the American Psychological Association. Representatives from thirteen foreign countries have already accepted invitations. Those of especial interest to the readers of this Journal who are expecting to be in attendance include Dr. Henry Pieron, Institute de Psychologie, Paris; Dr. Charles E. Spearman, London; and Dr. Emilio Mira, of Barcelona. The dates set for the meetings of the American Association for the Advancement of Science are June 19-30. The American Psychological Association will probably meet during early September for one week, the participants being housed in the University of Chicago dormitories.

## BOOK REVIEWS

SHIRLEY, MARY M. *The First Two Years.* A study of twenty-five babies. Vol. I, Postural and locomotor development. University of Minnesota Press, Minneapolis, 1931. xv + 227 pp. (Univer. Minn. Inst. Child Welfare, Monog. Ser. No. VI.)

GOODENOUGH, FLORENCE L. *Anger in Young Children.* University of Minnesota Press, Minneapolis, 1931. xiii + 278 pp. (Univer. Minn. Inst. Child Welfare, Monog. Ser. No. IX.)

ARLITT, ADA HART. *Psychology of Infancy and Early Childhood.* McGraw-Hill Book Co., New York, 1930. xiii + 382 pp.

STUTSMAN, RACHEL. *Mental Measurement of Pre-School Children.* World Book Co., Yonkers, 1931. x + 368 pp.

REYNOLDS, MARTHA MAY. *Negativism of Pre-School Children.* Teachers College, New York, 1928. viii + 126 pp. (Contributions to Education No. 288.)

The movement among American publishers to issue psychological books in series is one that demands the commendation of all psychologists. Although such a publishing plan primarily has a commercial value, yet it also tends to raise the standards in content and format of the books included. This apparently irrelevant point is raised because all of the five books to be reviewed belong to such series. Two of them are in the excellent monograph series of the Institute of Child Welfare of the University of Minnesota, while there is one each from McGraw-Hill's "Euthenics Series," The World Book Company's "Measurement and Adjustment Series," and Teacher's College, "Contributions to Education."

### INFANTS' POSTURE AND LOCOMOTION

Dr. Mary M. Shirley and Dr. Edith Boyd, a psychologist and physician respectively, studied twenty-five babies intensively throughout their first two years of life. The weekly examinations of the babies at home during the first year, and monthly during the second, were supplemented by a developmental history kept by the mother. Physical, mental, behavioral and personality traits were all studied for the purpose of securing an integrated picture of infant development. In this volume only the material concerned with postural and locomotor reactions are considered. The investigator found that the pattern of motor development followed a

rather definite sequence although there were time variations among the babies. From the earliest postural adjustments to the final walking the development pattern unfolds thus: "First, the baby attains postural control of the upper trunk region; second, his postural control moves downward to include the entire trunk region and in addition exhibits random activity little directed toward locomotion; third, he makes active and vigorous efforts at locomotion, but his poorly coordinated movements meet with only slight success; fourth, postural control of the entire body becomes complete, and the baby achieves locomotion by two or three methods; and fifth, postural control and coordination are combined and he reaches the goal of walking, toward which all of his development has been tending." The use of the verb "unfolds" is justified because the author holds that her data support the hypothesis that motor skill is a talent composed of a neuro-muscular tendency toward good gross motor coordination plus an interest in motor pursuits. Training and conditioning are subsidiary to these tendencies and the limits set by anatomical and physiological growth.

### Children's Anger

Florence L. Goodenough from an analysis of over 1,800 outbursts of anger in forty-five children between the ages of seven months and seven years and ten months has presented a picture of the concomitants of anger in young children. Her data were secured from record blanks filled out for each outburst by a parent or other person in charge of the child at the time. The peak in number of outbursts occurred at about two years of age and falls off rapidly thereafter, but with the older children the anger behavior is more directed toward a given end, while the activity becomes less primitively overt and more symbolic. The duration of outbursts remains about the same throughout the first eight years. A positive relationship was found between the number of outbursts and present and past illnesses, as well as with the number of adults in the household. Outbursts were more frequent immediately preceding mealtimes and fell off very rapidly immediately afterward.

In regard to the means of anger control her data show that it is perhaps unwise to establish a definite rule, variations in method with different children seem desirable, although "giving the child his own way" is reported much more frequently for children who have many outbursts than for those who have few.

Chapter VII on "Parent-child relationships" is an excellent treatment of her materials in a non-statistical manner. One could wish that more case material had been presented. The book con-

tains an excellent annotated bibliography of 172 titles divided into historical, theoretical and technical, and child training works.

### Child Psychology

Ada Hart Arlitt has enlarged her *Psychology of infancy and early childhood* in this second edition. It is an excellent text for courses in child psychology or child training for those who have had no previous psychology. It is much too elementary to follow a course in elementary psychology. Throughout the book schedules and plans for the supplementary study of infants are suggested, thus it can be used as a sort of laboratory manual. The last chapter is a very useful guide for parents for use with the every-day problems of childhood.

### A Pre-School Test

Rachel Stutsman's manual on the Merrill-Palmer pre-school scale of mental tests is a difficult book for this reviewer to write about. This scale has been used in the Indiana University Psychological Clinics for some time and we have nothing but the highest praise for it. Therefore any judgment on the manual is almost certain to be biased.

The scale, consisting of ninety-three items, is scored on a point basis, but tables of M. A. norms, and standard deviations of score values, M. A., and IQ are given. The tasks of the scale are well suited for pre-school children in interest value as well as type of performance required for their solution. For each of the tasks are given a description, directions for giving, method of scoring and a discussion of the values of that item. The statistical work has been carefully done and the standardization group has been selected with care so that various types of children are included. Of even greater clinical interest than the formal discussion of the test itself are the last seven chapters which present a guide for the observation of personality characteristics and a number of case studies of children examined in the Merrill-Palmer School. The first chapter is an exhaustive resumé of attempts to devise tests for the pre-school level, and this resumé is supplemented by a bibliography of 81 titles.

This pre-school scale deserves all the recognition it will inevitably get, but apart from that the manual is a valuable addition to every clinic library and a useful tool for every clinician.

NEGATIVISM

Probably the most difficult problem for the clinician working with very young children is the negativistic attitude. Martha May Reynolds has studied this attitude by setting up a series of situations designed to reveal the degree of negativism possessed by young children. In brief she finds that the peak of negativism occurs at about two years of age which is an interesting corollary to Dr. Goodenough's finding that anger occurs more frequently at that age. The cooperative child remains cooperative in all the situations while the originally uncooperative child remains uncooperative. The expression of negativism took various forms and there is probably no one type of behavior that can be called inherently more negativistic than another.

C. M. LOUTTIT,
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EARLE, F. M. *Methods of Choosing a Career.* London, Harrap, 1932, pp. 334.

The book is essentially a report on a rather extensive experiment conducted by the National Institute of Industrial Psychology. It involved 1,200 children who left school at the age of approximately 14 years. Half of them, picked at random, were given vocational advice on the basis of rather intensive study by the Institute and half were controls and had merely the usual school conference. The procedures followed and the comparison of subsequent success of experimental and control groups are presented in considerable detail.

The vocational study included a visit to the home, medical examination, group intelligence tests, performance tests, mechanical ability and dexterity tests, teachers' estimates and also tests in school subjects, rating of character and temperament obtained in a controlled interview and an evaluation of interests. The decision in the individual case was narrowed on the basis of general intelligence, then adaptability to working with people versus things versus papers, then dexterity and other special tests and finally parents' wishes, ambitions and opportunities. Occupations were studied likewise with reference to the qualities necessary for the worker and as to the number of available openings.

Some of the pupils followed the vocational advice and some did not. Both experimental and control groups were followed up for from 2½ to 4 years after leaving school. Information was sought as to what the person was doing, how he or she liked it and what the employer thought of him. Numerous difficulties were encountered in securing this information but the following sources were

exploited: employment exchange records, letters to the incumbents, visits to homes, parties at schools, visits to employers. The positions held were finally graded on a 5 point scale as to suitability of the position in comparison with ability.

The results of the follow-up are presented in detail with 66 tables. There appears longer tenure and greater efficiency on the part of the worker when there is a higher agreement between the work pursued and the advice given by the Institute. These tendencies are more pronounced with the experimental group than the control. Moreover the success appears greater for those who followed the advice than for those who were advised but did not heed. Many contradictory results appear on minor points and a great deal of interpretation is involved in keeping the main point intact but the reasoning all seems sound enough and if we take the average case it seems that the vocational procedure was worth while. The author suggests that the procedure might well be spread over several school years and that it might link up with educational guidance for those who do not leave school at the age involved in the present study.

The presentation of the material is systematic with detailed headings and sub-headings. The author gets out of the results all that there is in them and the analysis is quite exhaustive on some points. The whole project is most commendable and vocational guiders in this country will find it worth while to see what the British are doing in this field. The reviewer is impressed with the difficulty of the undertaking and a tremendous amount of work must have been involved in securing the data. He is also a trifle surprised at the apparently confident manner in which advice was given the pupils. The form letter to parents would state "we think that ——— is especially suited for ———. Should this be impossible the next best thing to do would be ———." Recommendations cited in some of the case studies are "clerical work;" "library or showroom; a less suitable alternative—dressmaking;" "nursemaid or lady's maid." Psychologists in this country would usually hesitate to make such flat statements. Perhaps they were made in the interest of the experiment. At any rate they seem to have been more effective than no advice at all although we do not have information as to whether any grave mistakes were made.

The appendix gives the standard group intelligence test used by the Institute, clerical and other tests and the vocational guidance form used by the Institute. The last of these strikes the reviewer as very good and comparing favorably with the blanks used by similar organizations in this country.

The book is in no sense a manual for the counselor but it does give some suggestive procedures and forms. It recounts an interesting experiment which vindicates the psychological approach. Psychologists interested in vocational guidance should look into it.

VITELES, MORRIS F. *Industrial Psychology.* New York. W. W. Norton and Company, 1932, XVIII + 652 pp. $4.25.

The book is divided into three portions, the first on the foundations of Industrial Psychology, the second on fitting the worker to the job, and the third on maintaining fitness at work. The last of these receives the most extensive treatment and the first the least extensive. The work is rather definitely oriented from the clinical standpoint. Some mention is made of statistical procedures particularly in employment but they are not stressed. The first section on foundations links up the problem with economic and social questions and sketches the historical perspective. Individual differences are discussed at some length with a rather interesting review of the comparative contribution of heredity and environment to such differences. The combined rôle of heredity and environment indicates the desirability of investigating innate abilities in employing workers and developing a training program for them after they are hired.

The second section on fitting the worker to the job notes the limitation of intelligence tests mainly to the lower borderline, to clerical work and to the professional level and then addresses itself to the study of more specialized traits. Job analysis is reviewed with appropriate emphasis on the psychological aspect. The interview and its limitations are presented and followed by some suggestions for improving the interview. Then we have application blanks and letters, the use of photographs and some discussion of the unsatisfactory procedures of character analysis.

The discussion of psychological tests follows conventional lines. There is appropriate emphasis on the criterion and rating scales are discussed in this connection rather than as a separate technique for investigating non-measurable traits. Tests used in specific industrial projects are illustrated,—trade tests, intelligence tests and tests of special ability. On the question of motor skill the author raises the question as to its general or specific character but does not commit himself entirely to one or the other alternative. Reliability and validity are treated rather briefly, largely by way of graphic methods. Many readers will be inclined to feel that a little more statistical consideration should be introduced at this point but the author evidently avoids this advisedly. The chapter on tests for skilled workers draws upon some of the ex-

tensive work in Germany with apprentices in the metal trades. Examination of motormen, taxi drivers, and office workers concludes this section.

The third section on maintaining fitness at work begins with accidents. The author establishes the existence of individual accident proneness by numerous citations of experimental studies. Efforts at measuring susceptibility to accidents and also predictions based on biographical items and environmental circumstances are considered. There is considerable emphasis on the individual clinical study of the victim of the industrial accident or the taxi driver with an accident record.

On the question of skill and training the author reviews a considerable amount of literature. He stresses reward rather than punishment in that the former promotes favorable feelings and attitudes as well as facilitating learning. On the whole versus the part method the author feels that it is desirable early in the training program to give the worker some notion of the process as a whole, although he still practices on the parts. With reference to speed versus accuracy he feels that while the initial emphasis should be upon accuracy, some emphasis should be placed upon speed as soon as possible. These conclusions are based upon a review of the theoretical literature and also experiments in industrial learning. The discussion of fatigue is based on a broad point of view that efficient work involves production at the least physiological cost to the worker with a minimum feeling of fatigue and dissatisfaction. Then follows a rather comprehensive but conventional discussion of hours of work, rest pauses, illumination, methods of conducting the work and of noise.

Monotony is discussed at greater length than in most recent works of this sort. Quite a bit of experimental work has appeared within the last few years. Such experiments are cited in considerable detail and a few current theories of monotony are presented. The author is inclined to lean towards those that attribute it to an attention set. Methods of alleviating it by selection of workers and adjustment of working conditions or of the work are discussed. The chapter on motivation leaves one with the impression that it is an extremely complicated problem in industry and due to numerous causes. The type of supervision receives considerable stress in this connection. Then we have a discussion of the maladjusted worker with some typical cases and clinical material and finally a brief treatment of supervision with considerable emphasis on leadership.

Three outstanding features of the book deserve special mention. In the first place, it is quite comprehensive and raises most of the

important problems in industrial psychology. Secondly, it gives us more information about industrial psychology in Europe than we will find in any other book in English. It is possible that many of us have underestimated the contribution of the German industrial psychologist. In the third place the treatment is very thorough. In many instances the author seems to be treating the topic about as he would in a review in the Psychological Bulletin where it is desirable to mention everything that has been written on a given point. This makes the work very valuable for the advanced student or the person who is technically engaged in the field. For the general reader it makes the book somewhat ponderous. Perhaps we should not consider the general reader at all in this connection. Certainly the specialist will appreciate the comprehensive survey of many of the topics and the detailed annotation. In some places it almost seems as though the author overdid the matter in giving footnote references to statements from the same article several times in succession on a single page in the present work. However, from the standpoint of usefulness of the book for reference purposes this is no drawback whatever.

The reviewer can find no serious sins of omission or commission. The point where he would be most inclined to take issue with the author would be in the latter's deliberate avoidance of any extensive statistical discussion. For the technical reader this is not a serious omission because he is familiar with such techniques in other works and the procedures are, after all, rather straightforward. For such readers the author's stress on the clinical viewpoint would, perhaps, be wholesome in the light of undue stress that has sometimes been given to the statistical possibilities. As far as the lay reader is concerned the reviewer thinks that it is somewhat desirable to give him at least some notion of the necessity of approaching many of these problems by a rather careful statistical analysis. Otherwise, the reader might possibly get the impression that the program of tests for selecting workers was somewhat simpler than it really is. However, the stress on the painstaking clinical methods made by the author is nevertheless wholesome.

As to other minor points it might be well to discuss rating scales as a separate technique for getting at character traits rather than introducing them merely in connection with building up an occupational criterion. The interview is presented more incidentally than the reviewer would be inclined to do. Along with the illustrative material on training various occupational groups, salesmen might very well be included because a lot of interesting work has been done in the training of salesmen. Morale, perhaps, is not

stressed as much as might be desirable, although questions pertaining to it are mentioned here and there throughout the discussion. It really merits a separate chapter of its own.

Such suggestions as the foregoing, however, involve points on which no two psychologists would agree anyway and represent rather minor differences in emphasis. The book will undoubtedly be on the desk of every industrial psychologist as a valuable reference work. Its thorough and comprehensive character mark it as one of the outstanding books in this field.

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## NEW BOOKS AND PAMPHLETS RECEIVED

Books and pamphlets for review should be sent to James P. Porter, Editor, JOURNAL OF APPLIED PSYCHOLOGY, Ohio University, Athens, Ohio.

*An Advance Test of General Intelligence.* NORA M. HALES. Melbourne University Press, Melbourne, Australia, 1932. 3 sh. 6 pence. 65 pp.

*Alcohol and Man.* HAVEN EMERSON, Editor. Macmillan Company, New York City. 1932. $3.50. 451 pp.

*Aspects of the New Scholastic Philosophy.* CHARLES A. HART, Editor. Benziger Brothers, New York City. 1932. $2.75. 311 pp.

*Australian Council for Educational Research.* Second Annual Report, 1931-32. 145 Collins Street, Melbourne, Victoria, Australia. 53 pp.

*Child Psychology.* BUFORD J. JOHNSON. Charles C. Thomas Company, Springfield, Illinois. $4.00. 439 pp.

*Correction of Defective Speech.* EDWIN B. TWITMYER AND YALE S. NATHANSON. P. Blakiston's Son & Company, Philadelphia. 413 pp.

*The Effect of a Vegetarian Diet on the Learning Ability of Albino Rats.* YUEH T'ANG, KUNG CH'IN AND YU HAI TSANG. National Research Institute of Psychology, 1 Fan-Chia Yuan, Peiping, China. 27 pp.

*La Formation Sociale dans l'Enseignement Secondaire.* JEAN JAOUEN. Les Edition du Cerf. Juvisy, Sein-et-Oise. 187 pp.

*Habits: Their Making and Unmaking.* KNIGHT DUNLAP. Liveright, Inc., New York City. 1932. $3.00. 322 pp.

*Man as Psychology Sees Him.* EDWARD S. ROBINSON. Macmillan Company, New York City. 1932. $2.50. 376 pp.

*The Nature of Human Conflicts.* A. R. LURIA. Liveright, Inc., New York City, 1932. $4.00. 431 pp.

*An Orientation in Educational Psychology.* DONALD W. MILLER. Richard G. Badger, Boston, Mass., 1932. 234 pp.

*Personality.* MARJORIE BARSTOW GREENBIE. Macmillan Company, New York City, 1932. $2.25. 328 pp.

*The Psycho-analysis of Children.* MELANIE KLEIN. W. W. Norton & Company, New York City. 1932. 393 pp.

*Psychology Applied.* GEORGE W. CRANE. Northwestern University Press, Chicago, Illinois. 1932. 586 pp.

*Psychology and Education.* R. M. OGDEN AND F. S. FREEMAN. Harcourt, Brace & Company, New York City. 1932. 350 pp.

*The Psychology of Literary Appreciation.* D. C. GRIFFITHS. Melbourne University Press, Melbourne, Australia. 4 shillings. 142 pp.

*Sinn and Unsinn.* WALTER BLUMENFELD. Verlag Von Ernst Reinhardt, Munchen. 110 pp.

*A Sociological Analysis of Certain Types of Patriotism.* EARLE L. HUNTER. Paul Marsel Company, New York City, 1932. 263 pp.

*The Story of Scientific Psychology.* ADELBERT FORD. Sears Publishing Company, New York City. 1932. $3.00. 307 pp.

*Students' Guide for Demonstrations of Psychological Experiments.* MILTON METFESSEL. McGraw-Hill Book Company, New York City. 1932. 45 pp.

*The Three Jameses.* C. HARTLY GRATTON. Longmans, Green & Company, New York City. 1932. $3.50. 376 pp.

*Workbook in Elementary Psychology.* A. E. BROWN. Macmillan Company, New York City. 1932. $1.25. 182 pp.

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**Journal of General Psychology**—Worcester, Mass.: Clark University Press. Subscription $7. 500-600 pages annually. Edited by Carl Murchison. Quarterly. Experimental, theoretical, clinical, and historical psychology. Founded 1927.

**Journal of Social Psychology**—Worcester, Mass.: Clark University Press. Subscription $7.00. 500-600 pages annually. Edited by John Dewey and Carl Murchison. Quarterly. Political, racial, and differential psychology. Founded 1929.

**Personnel Journal**—Baltimore: The Williams & Wilkins Co. Subscription $5.00. 500 pages, approximately. Edited by Walter V. Bingham. Bi-Monthly.

**Mental Measurement Monographs**—Baltimore: The Williams & Wilkins Company. Subscription $5. 400 pages annually. Edited by Knight Dunlap and Buford Johnson. Published without fixed dates, each number a single research. Founded 1925.

**Studies in Psychology and Psychiatry**—Baltimore: The Williams & Wilkins Company. Subscription $5.00. 400 pages annually. Edited by Edward A. Pace. Published without fixed dates, each number a single research. Founded 1926.

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**Child Development**—Baltimore, Md.: Williams & Wilkins Company. Subscription $5.00. 400 pages annually. Edited by Buford Johnson. Quarterly. Founded 1930.

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**Journal of Genetic Psychology and The Pedagogical Seminary**—Worcester, Mass.: Clark University Press. Subscription $7. 600 pages annually. Edited by Carl Murchison. Quarterly. Child behavior, differential and genetic psychology. Founded 1891.

**Psychological Review**—Princeton, N. J.: Psychological Review Company. Subscription $5.50. 540 pages annually. Bi-monthly. General Psychology. Edited by Howard C. Warren. Founded 1894.

**Psychological Monograph**—Princeton, N. J.: Psychological Review Company. Subscription $6.00 per vol. 500 pp. Ed. by Raymond Dodge. Published without fixed dates, each issue one or more researches. Founded 1895.

**Psychological Index**—Princeton, N. J.: Psychological Review Company. Subscription $4.00. 300-400 pp. Edited by W. S. Hunter. An annual bibliography of psychological literature. Founded 1895.

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**Journal of Abnormal and Social Psychology**—Eno Hall, Princeton, N. J. American Psychological Association. Subscription $5. Foreign, $5.25. Editor, Henry T. Moore. Quarterly. 448 pages annually. Abnormal and Social. Founded 1906.

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**Psychoanalytic Review**—Washington, D. C.: 3617 10th St., N. W. Subscription $6. 500 pages annually. Psychoanalysis. Quarterly. Ed. by W. A. White and S. E. Jelliffe. Founded 1913.

**Journal of Experimental Psychology**—Princeton, N. J. Psychological Review Company. 500 pages annually. Experimental. Subscription $6.00. Bi-monthly. Edited by S. W. Fernberger. Founded 1916.

**Journal of Applied Psychology**—Indianapolis: The C. E. Pauley & Co., Inc. Subscription $5.00. 400 pages annually. Bi-monthly. Edited by James P. Porter, Ohio University, Athens, Ohio. Founded 1917.

**Journal of Comparative Psychology**—Baltimore: The Williams & Wilkins Co. Subscription $5.00 per volume of 450 pages. Three volumes every two years. Edited by Knight Dunlap and Robert M. Yerkes. Founded 1921.

**Comparative Psychology Monographs**—Baltimore: Johns Hopkins University Press. Subscription $5. 400 pages per volume. Knight Dunlap, Managing Editor. Published without fixed dates, each number a single research.

**Genetic Psychology Monographs**—Worcester, Mass.: Clark University Press. Subscription $7.00 per volume. Two volumes per year, 600 pages each. Edited by Carl Murchison. Monthly. Each number one complete research. Child behavior, animal behavior and comparative psychology. Founded 1925.

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